Radio Systems Millenium-A Analog Console

Installation and Operation Manual

Radio Systems Millenium Analog Broadcast Manual — Part # MAN-MILLCONA

For Console Models:

RS-6A

RS-12A

RS-18A

RS-24A

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Revised to include

Illustration B-1 Updated to detail new Control Board part #18516
Illustration B-1 Updated to detail “classic” remote control protocol
Sect 2.2.9 Updated to reference New Control Prom 18406 Functionality
Illustration B-2 Updated to detail Cue/IFB Control
Illustration B-3 Included to detail “Classic” Control
Sect 1.3.2 Updated to reference new Switch-mode Power Supplies
Sect 2.2.3 Updated to reference correct Jumper designations
Illustration D-2 Corrected to reference part #18516
Illustration D-7 Corrected to reference part #10887

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Installation/Wiring/Operation

1.1 Console Placement

Because neither ventilation, or rear access is required, the console may be mounted on any sturdy surface. Opening the lid provides access to all electronics, internal controls and wiring points.

After placing the console, open the lid and mark the cable access slots on the chassis bottom on the table surface. Remove the console and cut the slots with a saber saw. The console may then be permanently mounted with two #10 sheet metal screws inserted through the two holes provided in the front of the chassis' bottom.

1.2 Opening the Console

A "T"-shaped lifter is provided by the factory to open the console.

This lifter can be inserted in any fader slot, angled and used to raise the lid. Once the lid is opened, the two hinges are pulled forward to lock the lid open.

To close the lid, push the hinges in to release the locks, while holding the lid up with the "T" lifter, and gently lower the console.

The external lifter discourages unauthorized access to console electronics.

1.3 Power Supply

1.3.1 Installation

All console operating voltages are provided by the external power supply which connects to the console via a multi conductor cable. A ten foot length is provided as standard equipment. Longer lengths, up to 20 feet, are available from the factory.

To install the cable, remove the top cover of the power supply and insert the end of the cable with the large solder lug through the rectangular cut out in the power supply back panel. Plug the connector into the circuit board and secure the solder lug to the ground stud provided on the inside rear panel. After replacing the top cover, the supply may be hung from the key-hold slots in the cover, placed on the shelf or the floor, or rack mounted with the optional rack adapter front panel.

To connect the console end of the power supply cable, pass the other end of the cable (with the smaller ground lug) through the rectangular hole on the center right-hand-side of the console base. Screw the ground lug under the mounting screw on the right front hand side of the Output Board. Plug the 10 position connector into J24 and the 4 position connector into J26(Ouput Board v.2: Plug the 10 position connector into J6 and the 4 position connector into J8).Take extreme care to plug these connectors in with the correct orientation - locking tab to loacking tab (with cables existing towards the right hand side) as it is possible to plug them in backwards.

A grounding stud is provided on the rear of the power supply. Console grounds reach a common point at the power supply. To minimize RFI and potential ground loop problems, the console should only be connected to station ground at this one ground stud.

In intense RF environments, or if you experience any RFI problems, consult RFI suppression in the Troubleshooting and Theory of Operation Section for detailed information.

1.3.2 Configuration

The power supply houses a switch-mode module and an interface and indicator board. This provides 15 volts for audio circuitry and 7.5 for control circuits.

Front panel LED's show the status of both 15 volt modules and the 7.5 voltages derived from the first module. Fuse holders are front panel mounted housing a 2 amp fuse for the first module and a one amp fuse for the second.

1.4 Wiring Access Layout

1.4.1 Connectors

Millenium Analog Consoles can be ordered with RJ-45 female connectors, pinned out to the StudioHub+ standard, or with 5-pin removable barrier strip connectors (quick connector).

1.4.2 Inputs

All audio inputs and audio patch points wire to the Six Channel Audio Board(s) on the base of the console. One board is utilized for every 6 channel positions. Audio inputs are stereo and balanced. The left and right channels of one input are wired to a single connector. Interstage channel audio patch points are unbalanced. These loop-thru inputs and outputs for each channel are accessible on a single 5 pin quick connector. On RJ-45 version consoles only, there is also a 3-pin post-fader patch point.

Consult the Six Channel Audio Board Section of this manual for detailed information on input and patch point wiring and level attenuation.

1.4.3 Outputs

All program outputs are balanced and appear on connectors on the Output Board.

Also mounted on this board are connectors for external monitor inputs, monitor sends, talk back, timer reset, cue audio, and control sends.

Consult the Output Board Section of the manual for detailed information on output and control wiring and level calibrations.

1.4.4 Control

The front panel mounted Six Channel Control Board houses one 15 pin D connector for each remote channel control.

Consult the Six Channel Control Board Section of this manual for detailed information on control remote functions and programming options.

Consult the Interface Options and Accessories Section of this manual for detailed information on the optional interface card applications, wiring and function.

1.4.5 Wiring Quick Connectors (5-Pin Connector Console Version)

Audio input and output connections to the console are made via 5-pin connectors. These connectors may be unplugged from the circuit board to facilitate wiring or servicing.

StudioHub+ wiring harnesses are available from Radio Systems which bring all input and output connections to convenient connection blocks outside the console. Consult the factory for literature.

1.4.6 Wiring RJ-45 Connectors (RJ-45 Connector Console Version)

Use standard TIA 568B RJ-45 STP patch cords or 22 AWG shielded wire for audio connections. The cable should be stripped so that the insulation comes close to, but does not enter the connector.

StudioHub+ wiring harnesses are available from Radio Systems which bring all input and output connections to convenient connection blocks outside the console. Consult the factory for literature.

1.5 Operation

The Millenium Consoles have been designed to offer the greatest combination of user flexibility and operating ease. Obviously, the console should be installed and operated in accordance with station format, personnel habits and engineering principles.

The following sections suggest some operational possibilities which were considered in the console design.

1.5.1 Input Assignment

Traditionally, commonly used inputs are assigned to input “A”. This gives the operator quick assurance of proper input selection.

1.5.2 Mic Use

Mic channels should always be activated with the slider down, and then potted up to avoid a sudden “room rush” of background sound.

Cue speaker muting is only provided when a mixing channel is turned “on”. Therefore, feedback can occur between the cue speaker or the monitor speakers (if cue monitoring is selected) and a mic input if the mic channel is placed in cue. To avoid this possibility, remove the cue inhibit jumpers on the section of the Six Channel Control Board associated with the mic channel. This will prevent a mic channel from entering the cue mode and possibly cuing feedback. Consult the Six Channel Control Board Section for details on programming information.

1.5.3 Cue Circuitry

Unless disallowed by jumper removal, all selected inputs maybe placed on the cue bus by depressing the cue button, located above the fader. Refer to Section 2.2 for additional information.

The cue signal is monitored by the cue speaker, and level adjusted by the front panel cue level control. The cue speaker is muted by any input that is turned “on” and that was pre-selected during installation to activate the Mute 1 control bus. The internal cue speaker may be disconnected and a remote speaker connected in its place. Consult the Output Board Section for detailed information on wiring.

In addition, the cue signal maybe selected for monitoring by the headphone or monitor amplifier select switches.

1.5.4 Output Routing

Each mixing channel can be routed to any combination of program (PGM), audition (AUD), and tel (TEL) mix buses. The program and audition buses provide identical stereo performance allowing the audition output to be used as a back up to the program bus, as a separate program bus, or to preview or record material. The TEL bus is a monaural.

1.5.5 Mix-Minus

Talk show hybrid telephone patches frequently require a return feed to the caller that does not contain his own voice (mix minus). To accomplish this, the host should be routed to PGM and TEL and the caller to PGM only. The TEL bus should then be fed back to the telephone hybrid and program audio used to feed the air chain. To prevent feedback in this application, the studio monitor speakers should not be used.

A “fold back” feed can also be created by feeding all microphone inputs into the PGM bus, and feeding all other inputs to both PGM and AUD mix buses. Switch the monitor speakers to AUD and feed the air chain with PGM. In this application the mic inputs need not mute the monitor speakers, as no feedback will result.

1.5.6 Monitor Amplifier Input Select

The monitor input select switches on the right hand side of the console allow monitoring of PGM, AUD, TEL, cue and four external stereo inputs which are common to the monitor and headphone circuitry. All monitor outputs follow these switches. Level adjustment for the control room monitor output is provided on the front panel. In addition, the control room monitor output is dimmed to an level which has been preset by a trimmer on the Output Board by the Mute 1 control bus. A studio monitor output which is muted by the Mute 2 bus, and an unmuted monitor output is also provided. In addition, a prefader, unmuted monitor output is available.

1.5.7 Headphone Amplifier Input Select

The headphone input select switches on the right hand side of the console allow monitoring of program, audition, tel, cue and four external stereo inputs which are common to the headphone and monitor circuitry. All headphone outputs follow these switches. Level adjustment and connection for the operator’s headphones are provided on the front panel. In addition, a pre-fader headphone output is available for driving an external headphone amplifier.

1.5.8 VU Meter Selection (6 Channel Consoles Only)

The six channel console provides only three meters. One meter is dedicated to the TEL output, while the remaining two are selected by a front panel switch to display either PGM or AUD outputs. The peak LEDs in the meters also follow the VU meter select switch.

1.5.9 Remote Control

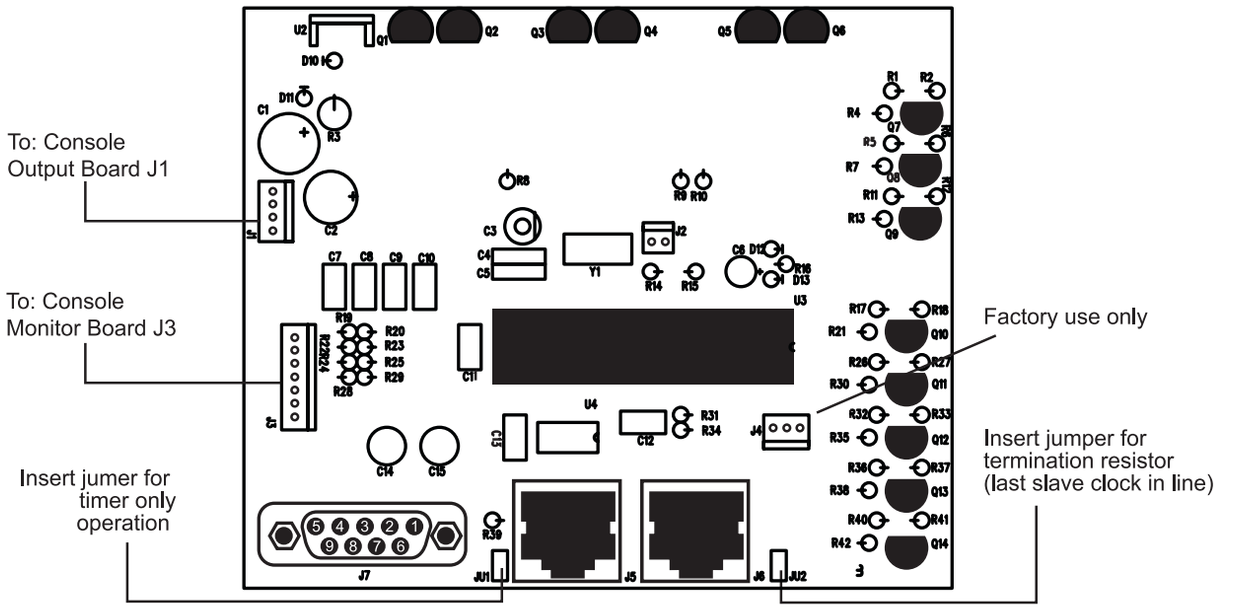
The Millenium Consoles provide extensive remote control using a 15-pin D connector located at each mixing channel. Each channel has the capability to remote start almost any source. In addition, each channel provides inputs for remote control of channel on/off and ready lamp illumination.

Sophisticated control interface is also accommodated with the use of the optional interface card (RS Part# 11022). See Section 2.2.9 and Illustration E-1 for additional information.

1.5.10 Eight Position Switcher

Eight accessory switches are provided on the right-hand side of the console for user control of external equipment or the optional Four Source Expander or Intercom Accessory boards. These switches and their associated LED indicators can be wired directly to external equipment using two 15-pin D connectors mounted on the underside of the monitor control board. Consult Illustration B-3 for more details.

Illustration A-1
CT-2002 Console Clock/Timer



J7 (9 Pin D Female)

Pin 1 Serial Data Out +
Pin 2 Serial Data In +
Pin 3 Serial Data In -
Pin 4 Serial Data Out -
Pin 5 GND
Pin 6 TOH Reset
Pin 7 GND
Pin 8 N/C
Pin 9 N/C

J5 & J6 (RJ-45)

Pin 1 Serial Data Out + (J5 only)
Pin 2 Serial Data Out - (J5 only)
Pin 3 Serial Data In +
Pin 6 Serial Data In -
Pin 4 GND
Pin 5 TOH Reset

General Operating Instructions

All units may operate in stand-alone or slave displays. Clock Set and Up Timer functions can be controlled by the front panel buttons or the infra-red remote control. However, the IR remote control is required for entering down times and internal setup functions.

Console Front Panel or Wired Remote Operation

Clock/Timer (Mode) Select
All CT-2002 units operate as both clocks and timers. Switch between modes by pressing the MODE button on the console front panel. The front panel LEDÕs will light to indicate the mode selected.

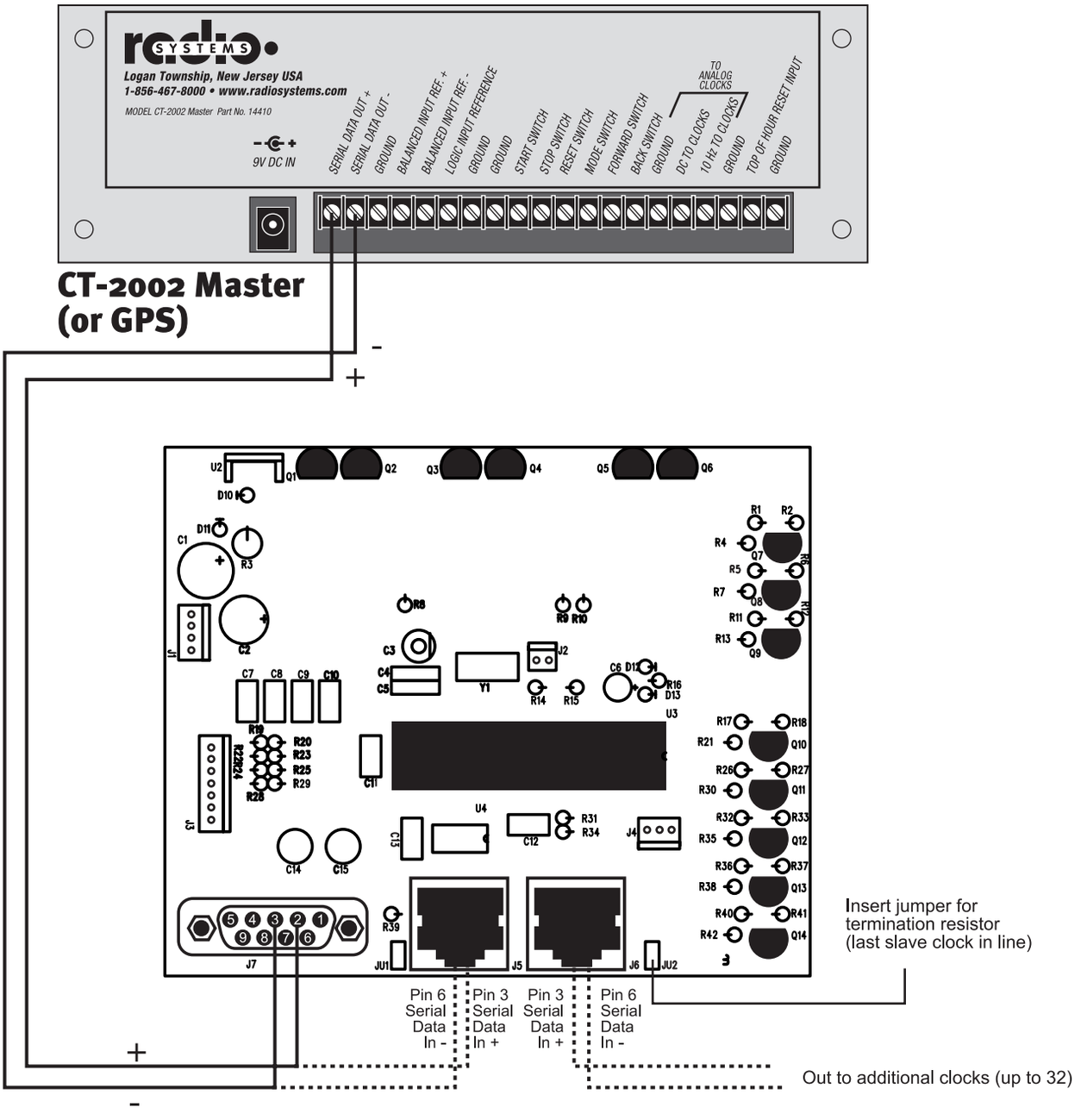
To Set the Clock:
1. Press the mode button to select the time-of-day display. The clock LED will illuminate.
2. Press and hold the STOP and START buttons. The set LED will illuminate. The display will reset to 12:00:00.
3. Press the STOP button to advance the hours. Press the RESET button to advance the minutes (note - seconds are not setable and remain at :00).
4. Start the clock at the top of the minute by pressing the START button. The set LED will extinguish.

Note: If Serial Time of Day is supplied to the CT-2002 (slave mode), it will not be possible to enter the Clock Set Mode. Time-of-day set can be done at the master unit. The displayed hours can be offset via the IR Remote Control.

To Use the Up Timer:
1. Press the Mode Button to select the timer display. The timer LED will illuminate.
2. Press the START button to start timing.
3. Press the STOP button to stop timing.
4. Press the RESET button to return the display to 00:00.

Note: Press the Auto button to allow automatic reset and start of the timer when a console channel on button is depressed (programming of JU15 for input A or JU17 for input B to allow this function on each channel is required).

Illustration A-2
CT-2002 Console Clock/Timer Wiring Diagram



J7 (9 Pin D Female)

Pin 1 n/c
Pin 2 Serial Data In +
Pin 3 Serial Data In -
Pin 4 n/c
Pin 5 GND
Pin 6 TOH Reset
Pin 7 GND
Pin 8 N/C
Pin 9 N/C

J5 & J6 (RJ-45)

Pin 1 Serial Data Out +
Pin 2 Serial Data In -
Pin 3 Serial Data In +
Pin 6 Serial Data In -
Pin 4 GND
Pin 5 TOH Reset

Six Channel Control Board

2.1 Overview

One Six Channel Control Board is provided for every six input channels. This card sends DC control voltages to the Six Channel Audio Board that:

Select A/B Inputs

Set output bus and cue routing

Set input level attenuation

Activate muting buses

Activate timer reset bus

This information is conveyed by a 16 conductor ribbon cables; one cable for every mixing channel.

Eighteen programming straps also reside on this board at each channel position and are used to set all unique channel and input board functions.

The board also includes a 15-pin remote control connector for each channel providing user access to all remote and channel functions.

Programming options available for each channel include:

Remote Control Options – by channel

Remote Control Options – by input

Muting Buses – by input

Timer Reset – by input

Cue Options- by channel

Cue Options – by input

Off (ready) lamp control operations – by input

2.2 Function Programming

2.2.1 Channel Power-Up Mode

It is sometimes desirable that certain channels ‘power up” in pre-set logic states. A common application for this feature is that channel(s) associated with an automation system intended to run unattended, be set to power up with the channel ON, and the correct input (e.g. A) and output bus (e.g. PGM) selected.

To set a channel to always power up in a specific pre-set mode - take the following steps:

1. Set the channel’s buttons in the desired INPUT, OUTPUT(S) and CUE modes
2. (For power up in the ON mode) - press and hold the ON switch for 5 seconds until the ON lamp blinks
3. (For power up in the OFF mode) - press and hold the OFF switch for 5 seconds until the OFF lamp blinks
4. Repeat this procedure on each channel where a special power-up mode is desired
5. Whenever the console power is re-cycled for any reason, these/this channel will power-up in its pre-set mode

Notes:

ON or OFF lamps blink and then extinguish to indicate that the programming is stored

When programming the ON function, the OFF lamp may also blink depending on the remote control wiring/configuration of the OFF lamp)

The default power-up mode is Input A / PGM / no CUE / Channel OFF

Fader position will not be memorized of changed, so faders must be left at standard operating level

It is still highly recommended that a good quality UPS of at least 1.5 KVA be installed prior to the console power supply to provide temporary back-up power as well as power line filtering

2.2.2 Remote Control Options – by Channel

Fader Start – The channel may be programmed to automatically turn on whenever the fader is brought out of the detent (cue) position. All programmed channel on functions (e.g. remote starts or timer reset) will activate at this time.

Note that a special order fader with detent (RS Part # P&G) is required for this option.

Insert jumper **A** to activate.

Default is no jumper; no fader start

2.2.3 Remote Control Options – by Input

2.2.3.1 Pulse/Holding Remote Control

Insertion of these jumpers determine whether the remote control pins on the remote control connector pulse to ground when the channel is turned on, or remain at ground potential for the duration of the channel ON state.

Pulse mode is generally used for cart machine and CD player control. Holding mode is generally selected for reel-to-reel or turntable control.

Insert jumper **H** for input A – holding mode.

Default is no jumper; pulse mode.

Insert jumper **C** for input B – holding mode.

Default is no jumper; pulse mode.

2.2.3.2 Send Through of Remote On/Off Commands

Installation of these optional jumpers will cause channel on/off commands which were initiated remotely (i.e. sent to the channel via remote connector pins 1, 2, 5, or 12) to, in turn, create remote on/off output pulses (i.e. send remote control commands to external equipment via remote connector pins 3, 4, 7, or 11). Normally, you would not want these remote channel commands to be “sent through”, thereby creating a new command and potentially retriggering the remote device via a false echo of the original command. This situation would apply when a remote device is wired to both control and be controlled by an input channel; typically the case with a digital storage system that is wired to be both remotely started by the channel and turn off the console channel at the end of the audio cut.

Insert jumper **D** to enable send through in input A.

Default is no jumper; no send through.

Insert jumper **B** to enable send through in input B.

Default is no jumper; no send through.

2.2.4 Muting Buses

Two muting buses, referred to as mute 1 and mute 2, perform the following functions:

Mute Bus 1 – mutes the cue speaker, dims monitor send #1, activates mute 1 send on Output Board connector J7.

Mute Bus 2 – mutes monitor send #2, activates mute 2 send on Output Board connector J7.

Insert jumper **T** for input A to mute bus 1.

Default is no jumper; no mute.

Insert jumper **P** for input A to mute bus 2.

Default is no jumper; no mute

Insert jumper **V** for input B to mute bus 1.

Default is no jumper; no mute

Insert jumper **R** for input B to mute bus 2.

Default is no jumper; no mute

See Illustration B-1, Pg16

2.2.5 Timer Reset

The insertion of timer reset jumpers programs operation of the timer reset bus in conjunction with a selected input. The bus will go low momentarily (100 ms) when the mixing channel is first placed into the “On” mode. Depressing the “On” button after the channel is already turned “On”, will result in another pulse of the bus.

Insert jumper **S** for input A to reset the timer.

Default is no jumper; no timer reset.

Insert jumper **U** for input B to reset the timer.

Default is no jumper; no timer reset.

2.2.6 Cue Options by Channel

2.2.6.1 Cue on Fader Detent

Enable this function to allow the operator to put the channel in cue by dropping the fader into the detent (fully down) position, Note that a special-order fader with detent (RS Part # P&G) is required for this option.

Insert jumper **K** to enable cue on detent

Default is no jumper; no cue on detent

2.2.6.2 Auto Cue

Cue follows channel On/Off mode with this option enabled. The channel will automatically go into cue whenever the channel is turned off. With this function enabled, cue still can be activated via the cue switch or fader detent.

Insert jumper **J** to enable auto cue

Default is no jumper insterted; no auto cue

2.2.6.3 Cue Defeat on Channel ON

Insert jumper **F** to cause the Cue Mode to be turned OFF whenever the channel is cycled from OFF to ON. Cue must then be manually re-selected when the channel is turned OFF.

2.2.6.4 Cue Exclusive

Insert jumper **N** to cause any mix bus (which is selected) to automatically mute when cue function is engaged.

2.2.7 Cue Options by Input

Install these jumpers to disallow the channel from going into cue when a particular input is selected. This option is normally utilized for a control room mic input to avoid feedback from the cue speaker. When this option is enabled, the cue button is automatically reprogrammed to act as a cough button (hold-to-mute) for that input.

Install jumper **M** for no cue on input A.

Default is no jumper; cue in input A.

Install jumper **L** for no cue on input B.

Default is no jumper; cue in input B.

See Illustration B-1, Pg16

2.2.8 Off (Ready) Lamp Options

These jumpers allow for local (console) or remote (source) control of the channel off (ready) lamp via the remote control connector.

Install jumper **X** between the left and middle header pins for input A local Off lamp control.

Install jumper **X** between the middle and right header pins for input A remote Off lamp control.

Default is left and middle pins jumpered; local off lamp control.

Install jumper **W** between the left and middle header pins for input B local Off lamp control.

Install jumper **W** between the middle and right header pins for input B remote Off lamp control.

Default is left and middle pins jumpered; local Off lamp control.

2.2.9 Remote Control Connector

A 15-pin D connector is provided on the Six Channel Control Board for each channel to access all remote functions.

All control (input) functions are activated via a momentary pull-to-ground, except the “cough” function, which must be held to +15V. All control output functions are open lines which go low when the function is activated. Lamp drivers are current-sinking inputs.

Two modes of remote control functionality are available via recently supplied PROMS. These modes are selected via the installation of jumper **E**. In the default mode (**E** not installed,) remote control cue for IFB applications is provided. With jumper **E** installed, “Classic” remote control functionality, identical to previous PROM versions is provided.

Refer to Illustration B-2 and B-3 for a pin-by-pin reference descriptions and wiring diagram.

2.2.10 Optional Remote Board

Radio Systems’ optional Remote Board (RS Part # REMOTE) connects to the remote control connector and provides the user with programmable relay interface for channel remote control outputs and opto-isolated input to channel on/off and off lamp functions. Consult the interface option section for more details and pin-out and wiring diagrams.

2.2.11 Monitor Control Board

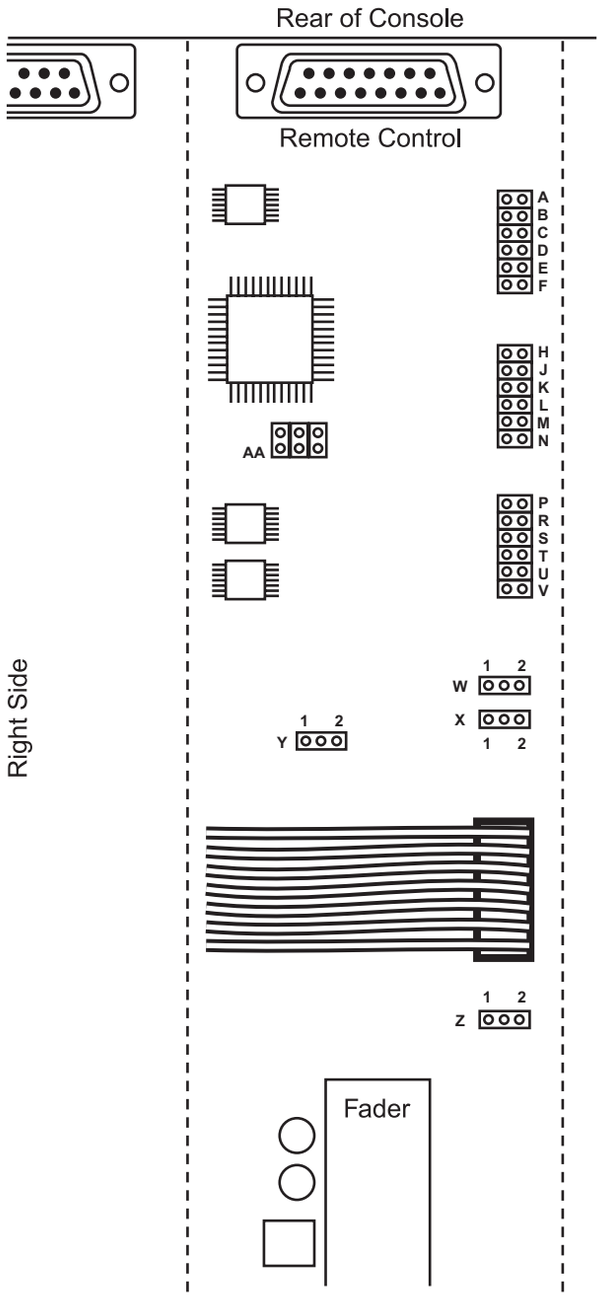
One monitor card (RS Part #10887) is installed on the right-hand side of the console front panel. It provides all monitor and clock switching and logic functions.

The monitor board also provides eight uncommitted, illuminated momentary switches for remote control of source equipment. Access to these switch and LED connections is made with two 15-pin D connectors on the underside of the board. Refer to Illustration B-3 for pin-out and wiring diagrams.

Radio Systems offers an optional logic card (RS Part # LOGIC) which adds push-on/push-off or interlocked switch functions for these switches. This card also is used to interface the switches to the optional four source expander (RS Part # ROUTER) or Intercom card (RS Part #INTERCOM). Consult the interface options section of this manual for more information.

See Illustration B-1, Pg16

Illustration B-1
Six Channel Control Board Jumper Settings for Millenium Analog Consoles
Part # 18516



Front of Console
Input Control Board (Channel One Shown)

Board Location*	Channel Logic Jumpers
A	Install for fader start (special order fader required)
B	Install for remote B start and stop commands to control the remote outputs
C	Install for input B to hold and remove for input B to pulse the remote pulse/hold outputs
D	Install for remote A start and stop commands to control the remote pulse/hold outputs
E[R]	Install for “classic” remote control protocols
F	Install to disengage cue when channel is turned on
H	Install for input A to hold and remove for input A to pulse the remote pulse/hold outputs
J[Q]	Install for cue to follow the on/off mode for “Auto-Cue”
K[Q]	Install for cue on fader detect (special order fader required)
L[Q]	Install for no cue in input B (cue switch is now cough for input B)
M[Q]	Install for no cue in input A (cue switch is now cough for input A)
N	**Install for “Cue Exclusive” (turn off mix buses when in cue mode)**
P	Install for Input A mute 2
R	Install for input B mute 2
S	Install for timer reset with input A
T	Install for input A mute 1
U	Install for timer reset with input B
V	Install for input B mute 1
W	**Input B stop lamp local/remote jumper. Jump pin 2 to center pin for local console lamp control** (Jump pin 1 and center pin for remote lamp control)
X	**Input A stop lamp local/remote jumper. Jump pin 2 to center pin for local console lamp control** (Jump pin 1 and center pin for remote lamp control)
Y	**Jumper must be installed between pin 2 and center pin for cue bus lamp normal operation**
Z	**Jumper must be installed between pin 1 and center pin for analog console operation**

Notes:

Items in bold are factory default jumper settings.

See following page for remote control connector pin-outs.

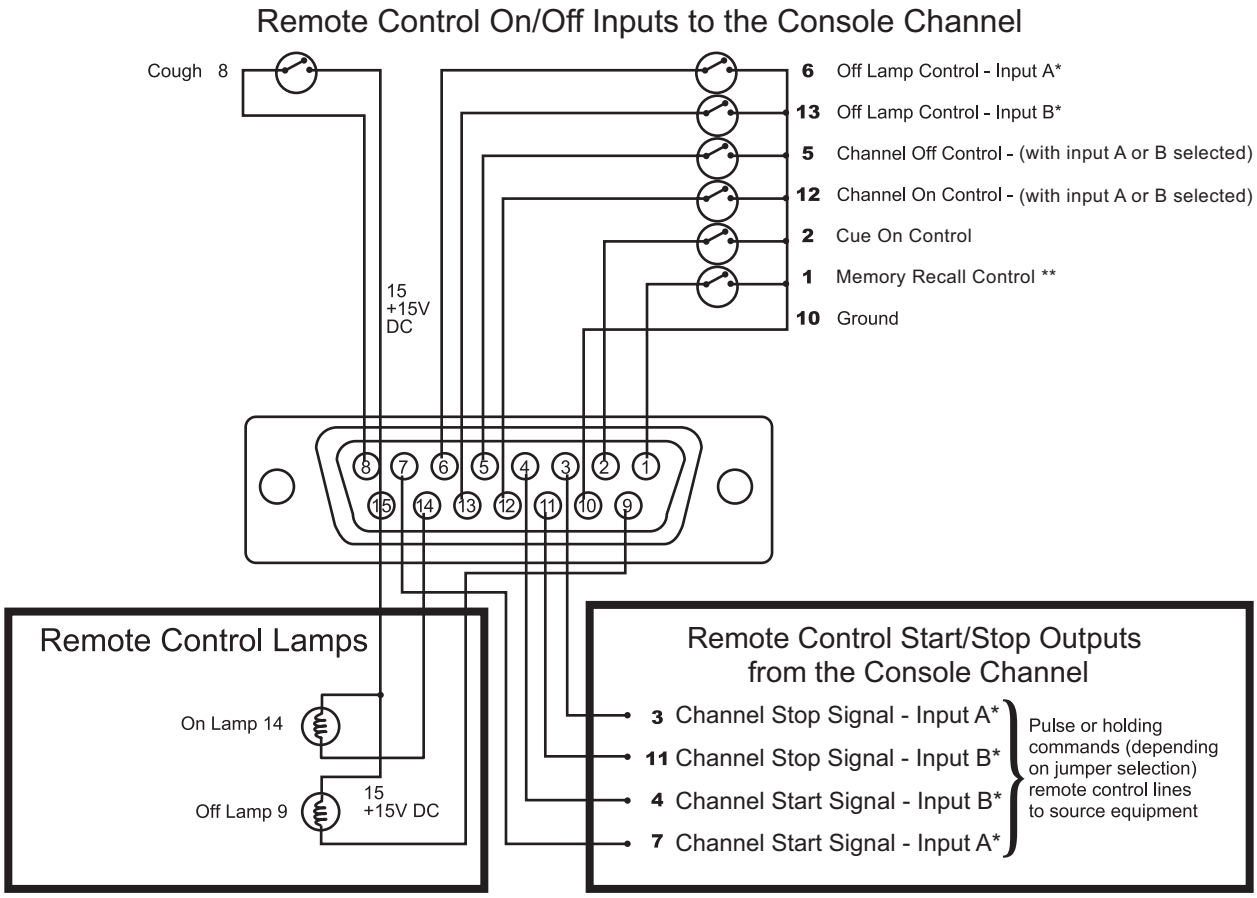
Consult section 2.2 for a detailed explanation of control programming and functions.

[Q] Cue Options - Consult manual section 2.2.6 and 2.2.7 for various cue modes and operational descriptions.

[R] Remote Options - See illustration B-2 and B-3 for remote control options, settings and wiring.

Illustration B-2
Remote Control Wiring - with remote cue available for IFB
(for console models shipped after 10/15/10 with control prom PN: 18406)

Note: Jumper E on Input Control Board must be removed to initiate this mode of remote control (this is factory default setting)


Remote Control On/Off Inputs to the Console Channel
Cough 8
15
+15V
DC
6 Off Lamp Control - Input A*
13 Off Lamp Control - Input B*
5 Channel Off Control - (with input A or B selected)
12 Channel On Control - (with input A or B selected)
2 Cue On Control
1 Memory Recall Control **
10 Ground
8 7 6 5 4 3 2 1
15 14 13 12 11 10 9
Remote Control Lamps
On Lamp 14
Off Lamp 9
15
+15V DC
Remote Control Start/Stop Outputs
from the Console Channel
3 Channel Stop Signal - Input A*
11 Channel Stop Signal - Input B*
4 Channel Start Signal - Input B*
7 Channel Start Signal - Input A*
Pulse or holding commands (depending on jumper selection) remote control lines to source equipment

Functions Descriptions

Pin #	Function
1	Input to engage channel memory recall **
2	Input to engage the cue mode when either input A or B is selected
3	Output from the console to **stop** a source if input A is selected
4	Output from the console to **start** a source if input B is selected
5	Input to turn the console channel **off** when either input A or B is selected
6	Input to turn the console channel **off** Lamp Control - Input A
7	Output from the console to **start** a source if input A is selected
8	Holding input to turn the console channel **off** (cough function)
9	Remote channel **off** lamp
10	Ground
11	Output from the console to **stop** a source if input B is selected
12	Input to turn the console channel **on** when either input A or B is selected
13	Input to turn the console off lamp **on** if input B is selected
14	Remote channel **on** lamp
15	+15V

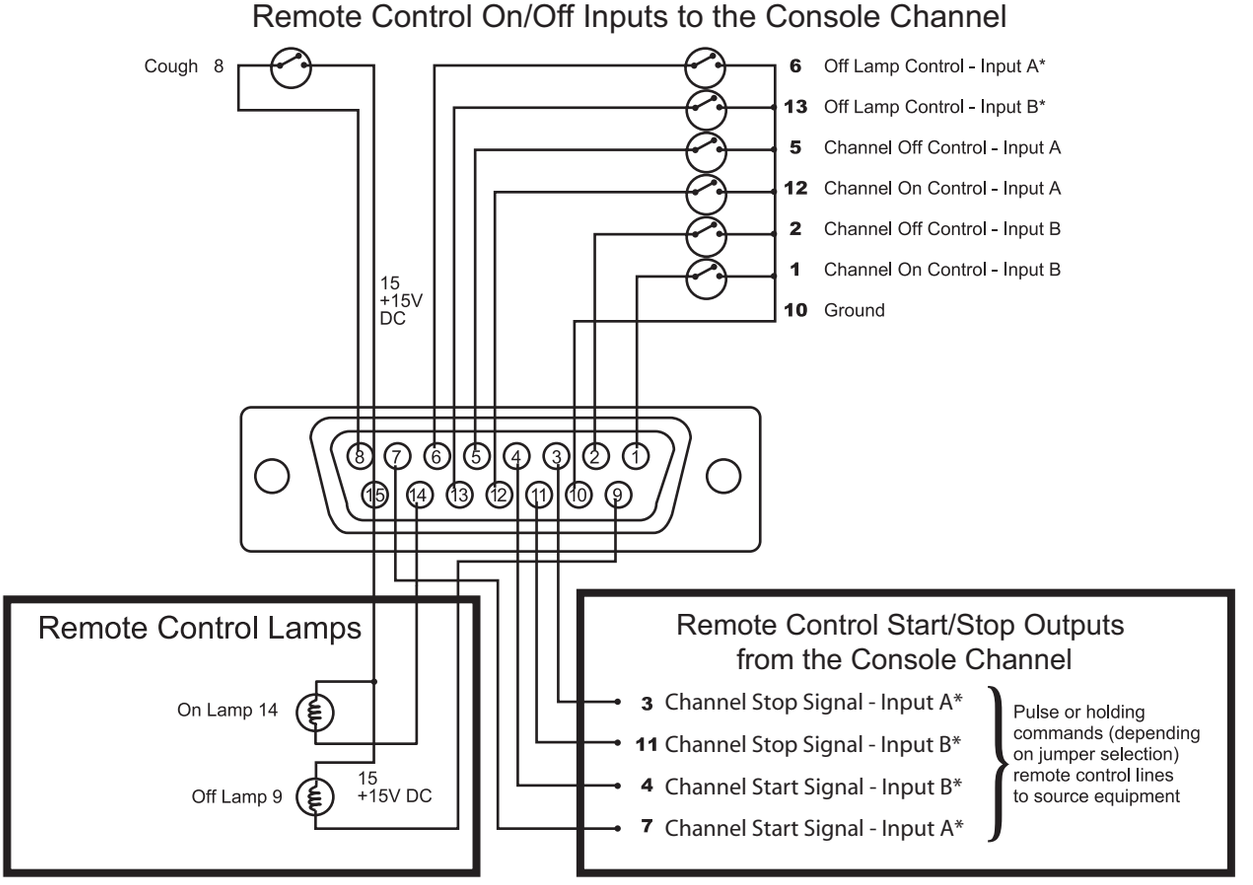
Notes

* These functions require programming on the input control card. See preceding page for details.
** "Memory Recall" engages the channel powerup of stored channel functions. See manual section 2.2.1 for details.
Control inputs to the console (pins 1,2,5 & 12) require a momentary contact to ground to activate.
Lamp Control inputs to the console (pins 6 & 13) require a holding contact to ground to activate.
Control outputs from the console (pins 3,4,7 & 11) are open collector lines which go low (to ground) when activated.
The cough button (pin 8) requires a holding connection to +15 volts (pin 15) for the duration of the function.

Illustration B-3
Remote Control Wiring - "Classic" Version

(for console models shipped after 10/15/10 with control prom PN: 18406)

Note: Jumper JU213 on Input Control Board must be installed to initiate this mode of remote control.


Remote Control On/Off Inputs to the Console Channel
Cough 8
15
+15V
DC
6 Off Lamp Control - Input A*
13 Off Lamp Control - Input B*
5 Channel Off Control - Input A
12 Channel On Control - Input A
2 Channel Off Control - Input B
1 Channel On Control - Input B
10 Ground
8 7 6 5 4 3 2 1
15 14 13 12 11 10 9
Remote Control Lamps
On Lamp 14
Off Lamp 9
15
+15V DC
Remote Control Start/Stop Outputs
from the Console Channel
3 Channel Stop Signal - Input A*
11 Channel Stop Signal - Input B*
4 Channel Start Signal - Input B*
7 Channel Start Signal - Input A*
Pulse or holding
commands (depending
on jumper selection)
remote control lines
to source equipment

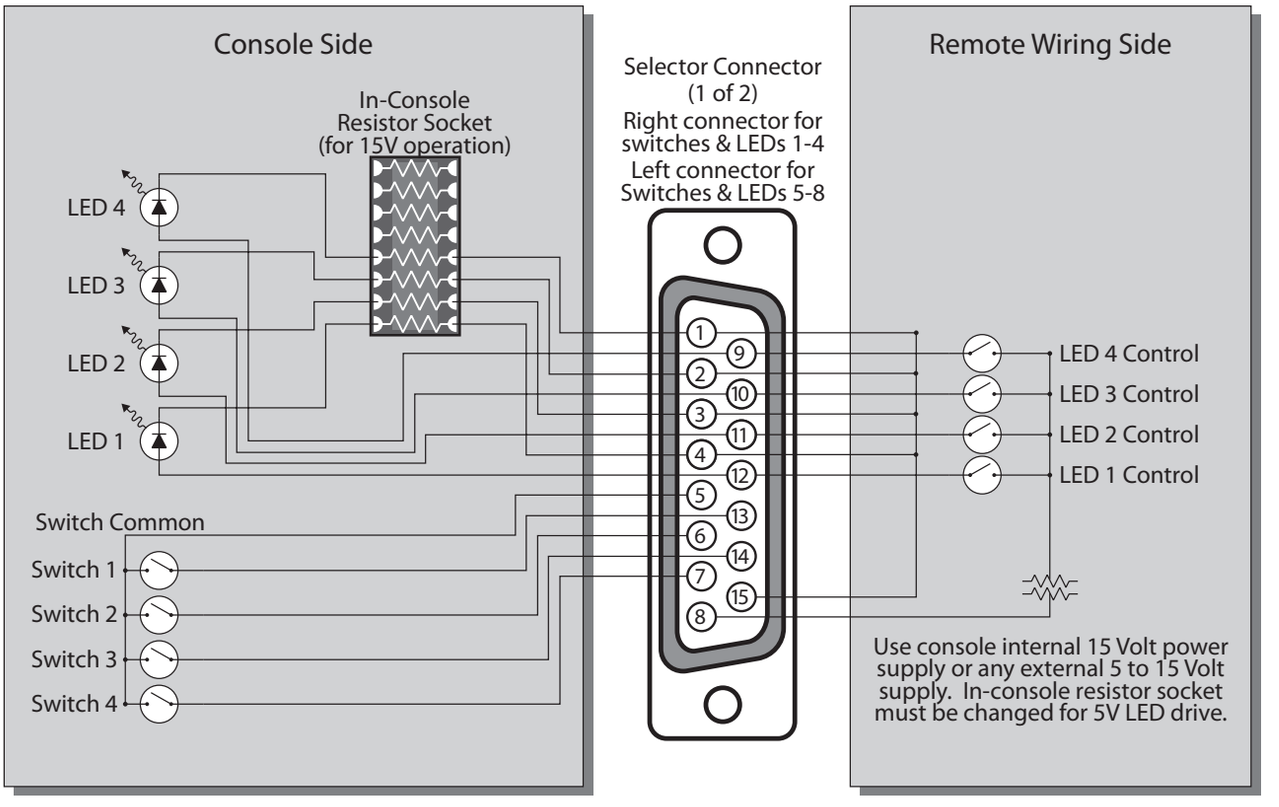
Functions Descriptions

Pin #	Function
1	Input to turn the console channel **on** if input B is selected
2	Input to turn the console channel **off** if input B is selected
3	Output from the console to **stop** a source if input A is selected
4	Output from the console to **start** a source if input B is selected
5	Input to turn the console channel **off** if input A is selected
6	Input to turn the console channel **on** if input A is selected
7	Output from the console to **start** a source if input A is selected
8	Holding input to turn the console channel **off** (cough function)
9	Remote channel **off** lamp
10	Ground
11	Output from the console to **stop** a source if input B is selected
12	Input to turn the console channel **on** if input A is selected
13	Input to turn the console off lamp **on** if input B is selected
14	Remote channel **on** lamp
15	+15V

Notes

*These functions require programming on the input control card. See preceding page for details.
Control inputs tot he console (pins 1,2,5 & 12) require a momentary contact to ground to activate.
Lamp Control inputs to the console (pins 6 & 13) require a holding contact to ground to activate.
Control outputs from the console (pins 3,4,7 & 11) are open collector lines which go low (to ground) when activated.
The cough button (pin 8) requires a holding connection to +15 volts (pin 15) for the duration of the function.

Illustration B-4
Monitor Board Wiring



(Mfg. part#761-3-R680, R.S. part#11157) (Mfg. part#761-3-R680, R.S. part#11157)

Function Descriptions

Pin #	Function
1	LED 4 Cathode Lead
2	LED 3 Cathode Lead
3	LED 2 Cathode Lead
4	LED 1 Cathode Lead
5	Switch Common Lead
6	Switch 2 N.O. Lead
7	Switch 4 N.O. Lead
8	+15 Volts DC
9	LED 4 Anode Lead
10	LED 3 Anode Lead
11	LED 2 Anode Lead
12	LED 1 Anode Lead
13	Switch 1 N.O. Lead
14	Switch 3 N.O. Lead
15	Ground

Notes

Install the optional Radio Systems logic card (part number 11027) to add push-on/push-off, exclusive, and lamp follow functions to the selector buttons.

LEDs are factory set for 15 Volt operation. To change to 5 Volt operation, exchange the resistor dip package located just under the two selector "D" connectors. For 5 Volt operation, install the 330ohm package included in the accessories package (Mfg. part#761-3-R220, R.S. part#11158). For 15 Volt operation, re-install the 680 ohm resistor package (Mfg. part#761-3-R680, R.S. part#11157).

Six Channel Audio Board

3.1 Input Connectors

Illustration C-1 shows the location of all board input and patch point connectors as well as the pin-outs of the connectors for 5-pin version consoles. Illustration C-2 shows the location of all board input and patch point connectors as well as the pin-outs of the connectors for RJ-45 version consoles.

3.1.1 Input Wiring

Every input, from mic thru high level wires to the input connectors. One connector is provided for each channel “A” input and another is provided for each “B” input. Each connector handles left and right balanced audio from the source equipment.

5-pin consoles provide one ground terminal on each connector for the audio inputs. RJ-45 consoles provide a jumper behind the input connector to select grounding options. Grounds should be connected at either the console or equipment and not at both ends, to avoid ground loops. The console is usually used as the grounding reference point.

3.1.2 Unbalanced Audio

If an unbalanced audio source is to be connected to the console, single conductor shielded cable or two conductor shielded cable with a foil shield around each conductor should be used. The audio should be connected to the + input, while the shield should be connected to both the - input and ground. In this case, the shield is connected at both ends of the cable.

3.1.3 Mono Inputs

For consoles produced after September, 2008: Inputs can be made mono by installing the mono/stereo select jumpers as shown in Illustration C-1 (5-pin version console) or Illustration C-2 (RJ-45 version console).

For 5-pin version consoles produced prior to September, 2008: If one input (A or B), rather than an entire channel is to be fed from a mono source, connect the Left+ input to the Right+ input and connect the Left- input to the Right- input. If an entire channel is dedicated to mono sources (both A and B inputs) wire the input signal only to the Left Input and refer to illustration C-1 for proper jumper placement on header J7.

3.2 Input Gain

3.2.1 Channel Sensitivity

The gain of an entire channel or the gain of an individual input can be changed to accommodate any mix of different input source levels.

Overall channel gain is changed by installing jumpers into gain header J5 for the left channel and gain header J6 for the right channel. The gain jumpers allow selection of four different overall gain range sensitivities; line (0 to +8 dBv), and mic (-55 to -35 dBv), low (-20 to -10 dBv), and consumer (-10 to 0 dBv). Mic level sensitivity also requires the use of a mic level attenuator dip carrier, as described in the next section on input sensitivity.

Changing gain headers effects the gain of the entire channel (both inputs). Refer to illustration C-3 for channel sensitivity strap programming.

3.2.2 Input Sensitivity

Individual input gains are changed by plugging any of 5 standard input attenuator DIP (IAD) carriers into the channel A or B input attenuator DIP sockets. The IAD’s are used to reduce the sensitivity of an input after it has been increased via the channel gain straps. This allows the use of sources of radically different output levels on the A and B inputs of the same channel. An example where an IAD would be utilized, would be to allow a line level source to be connected to a “B” input after the channel sensitivity had raised to consumer level to accommodate a CD player on an “A” input.

In other words, channel gain straps are set to increase channel sensitivity to accommodate the channel’s lowest level source (such as a mic), and IAD’s are used to restore the original sensitivity, or any lower sensitivity for the other chan-

nel input. The only exception is that a special IAD (factory provided as part # “AT-M”) is utilized to increase the input sensitivity any time a mic is used.

Five standard IAD’s are provided by the factory. These include the one for use with mics, and four standard values of input attenuation. Illustration C-3 charts which IAD should be utilized under different source level combination situations, and shows the parts values any construction of the IAD’s.

3.3 Patch Point Connections

3.3.1 Pre-Fader, Pre-On/Off Patch Point

An unbalanced pre-fader stereo loop-thru is provided at the insert point on header J8. The nominal level at this point is typically between -6dBv and +ldBv. The Send output impedance is 400 ohms, and the Return input impedance is 20K ohms.

The patch point maybe used two different ways. The first application is to insert a piece of processing gear into the audio chain. In this instance, the patch point bypass jumpers, which are installed on header J7 (positions A and C) must be removed.

Input and output loop-thru connections are made using a 5 pin quick connector installed at the patch point header J8. Refer to Illustration C-1 (for 5-pin version consoles) or Illustration C-2 (for RJ-45 version consoles) for pin-outs.

Single conductor shielded cable, or two conductor shielded cable with a foil shield around each conductor should be used for patch point connections. The shield should be tied to ground at both the console and at the external gear. In addition the external gear should:

1. operate at unity gain
2. have a bridging input and present a load of 2K ohms or greater to the output of the input amplifier
3. have an low output impedance of IK ohms or less

If mono operation is desired, wire the output from the external gear to both the left and right return connector positions. In this application, the output from external gear will see a 10K load from the console.

The second application of the patch point is for a parallel feed off of the input amplifier. An example would be to feed the microphone channel into the talk back circuitry. In this application, jumpers A and C should be in place on header J7 and all wiring to J8 should be made to pins 2 (left), 4 (right), and 3 (ground).

The optional DA card can be used to balance and isolate the patch point sends and receivers in either the loop-thru or parallel feed applications. Consult the Interface Options and Accessories Section of the manual for more information.

3.3.2 Post- Fader, Pre-On/Off Patch Point

For consoles produced after September, 2008, there also is an unbalanced post-fader, pre-on/off audio patch point connector available. The mating connector for this patch point is not provided in the console startup kit. Contact the factory for availability and pricing. A ten foot connectorized pigtail is available from the factory to utilize this patch point; the P/N is 16867.

Illustration C-1
Six Channel Audio Board - 5 Pin

Jumper Programming

Input or Chassis Ground Select

Input Ground — Chassis Ground (Default)

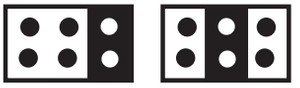
Mono/Stereo Select

Stereo Input (Default)

Mono Input

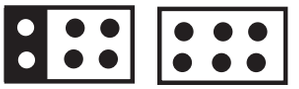
Note: in mono mode left channel feeds both left & right.

Channels Sensitivity Select



"A" Strapped — Consumer Level (-10 to 0 dBv)

"B" Strapped — Line Level (-20 to +10 dBv)



"C" Strapped — Mic Level (-55 to -35 dBv) (with AT-M in)

None Strapped — Line Level (0 to +8 dBv)

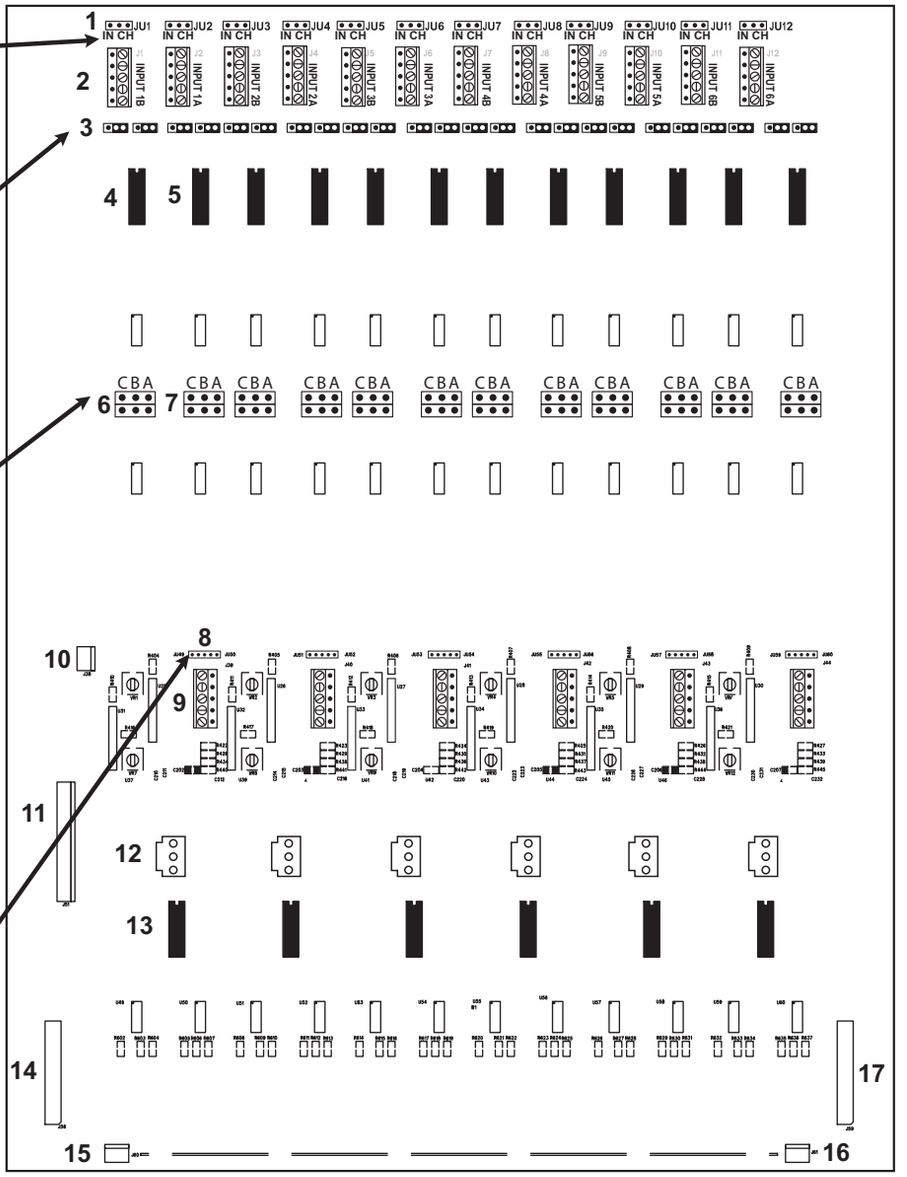
Loop Thru Bypass and Mono Select

No pins strapped — Loop-Thru Connector in Circuit

Position A and C strapped (Pins 1/2 & 4/5 strapped) — Loop-Thru Connector in Bypass

Position B and C strapped (Pins 2/3 & 4/5 strapped) — Loop-Thru Connector Bypassed and A & B Inputs in Mono

SIX CHANNEL INPUT BOARD with 5 Pin CONNECTORS

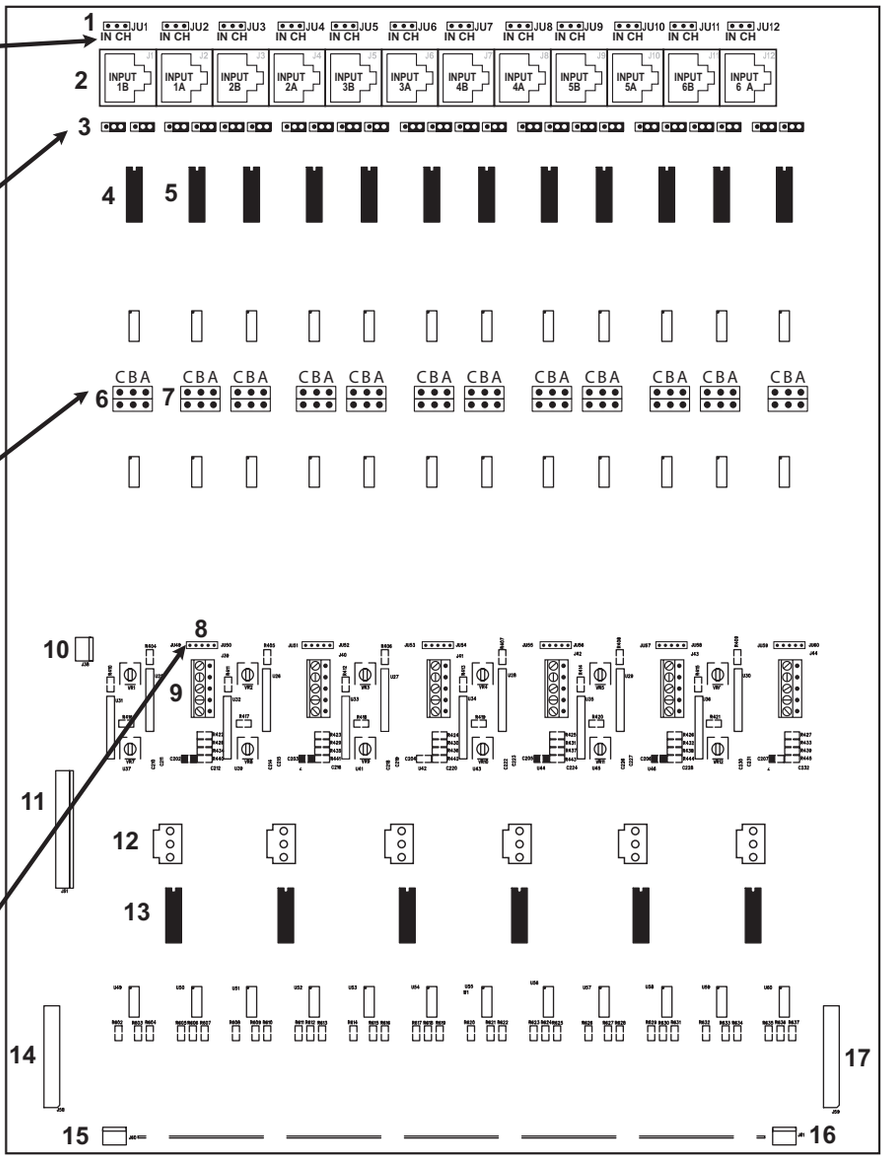


Input Connectors (Stereo balanced)	2	5 R+ In 4 R- In 3 Ground 2 L- In 1 L+ In
Pre Fader Audio Loop-Thru Connectors (Stereo unbalanced)	9	1 L In 2 L Out 3 Ground 4 R Out 5 R In
Post Fader Audio Output Connectors (Stereo unbalanced)	12	1 L Out 2 Ground 3 R Out

1. Input or Chassis Ground Select
2. Input Connector
3. Mono/Stereo Select
4. Input B Attenuator Dip
5. Input A Attenuator Dip
6. Right Channel Sensitivity Select
7. Left Channel Sensitivity Select
8. Pre-Fader Audio Loop-Thru Bypass Select
9. Pre-Fader Audio Loop-Thru Connector
10. Aux. Power Supply Output
11. Power Supply Input
12. Post Fader Audio Patch Point Connector
13. Mixer Control Cable DIP Socket
14. Mix Buses - Loop Out
15. Audio Ground - Loop Out
16. Audio Ground - Loop In
17. Mix Buses - Loop In

Illustration C-2
Six Channel Audio Board - RJ-45

SIX CHANNEL INPUT BOARD with RJ-45 CONNECTORS



Jumper Programming

Input or Chassis Ground Select

Input Ground — Chassis Ground (Default)

Mono/Stereo Select

Stereo Input (Default)

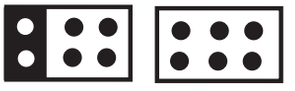
Mono Input

Channels Sensitivity Select

"A" Strapped — "B" Strapped

Consumer Level (-10 to 0 dBv) — Line Level (-20 to +10 dBv)

"C" Strapped — None Strapped



Mic Level (-55 to -35 dBv) (with AT-M in) — Line Level (0 to +8 dBv)

Loop Thru Bypass and Mono Select

No pins strapped

Loop-Thru Connector in Circuit

Position A and C strapped (Pins 1/2 & 4/5 strapped)

Loop-Thru Connector in Bypass

Position B and C strapped (Pins 2/3 & 4/5 strapped)

Loop-Thru Connector Bypassed and A & B Inputs in Mono

Input Connectors (Stereo balanced)	2	1 L+ In 2 L- In 3 R+ In 6 R- In
Pre Fader Audio Loop-Thru Connectors (Stereo unbalanced)	9	1 L In 2 L Out 3 Ground 4 R Out 5 R In
Post Fader Audio Output Connectors (Stereo unbalanced)	12	1 L Out 2 Ground 3 R Out

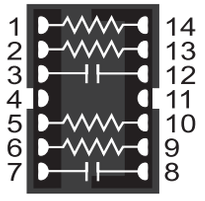
1. Input or Chassis Ground Select
2. Input Connector
3. Mono/Stereo Select
4. Input B Attenuator Dip
5. Input A Attenuator Dip
6. Right Channel Sensitivity Select
7. Left Channel Sensitivity Select
8. Pre-Fader Audio Loop-Thru Bypass Select
9. Pre-Fader Audio Loop-Thru Connector
10. Aux. Power Supply Output
11. Power Supply Input
12. Post Fader Audio Patch Point Connector
13. Mixer Control Cable DIP Socket
14. Mix Buses - Loop Out
15. Audio Ground - Loop Out
16. Audio Ground - Loop In
17. Mix Buses - Loop In

Illustration C-3
Input Attenuator (IAD) Programming

Source Level Input A	Source Level Input B	Channel Gain Jumpers (J5 & J6)	Input Attenuator DIP J4 (Input A)	Input Attenuator DIP J3 (Input B)
Line	Line	none	none	none
Mic	Line	C	AT-M	AT-45
Low	Line	B	none	AT-20
Consumer	Line	A	none	AT-10
Line	Mic	C	AT-45	AT-M
Mic	Mic	C	AT-M	AT-M
Low	Mic	C	AT-25	AT-M
Consumer	Mic	C	AT-35	AT-M
Line	Low	B	AT-20	none
Mic	Low	C	AT-M	AT-25
Low	Low	B	none	none
Consumer	Low	B	AT-10	none
Line	Consumer	A	AT-10	none
Mic	Consumer	C	AT-M	AT-35
Low	Consumer	B	none	AT-10
Consumer	Consumer	A	none	none

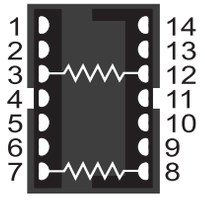
IAD Part Values

All resistors are 19.1 Ohm 1%
both capacitors are .022 µf



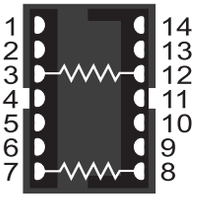
AT-M
+13 dB
(white)

Both resistors are
1.58K Ohm 1%



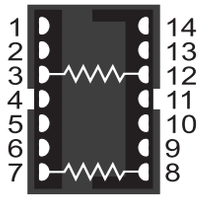
AT-10
-10 dB
(blue)

Both resistors are
383 Ohm 1%



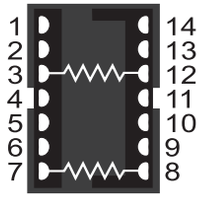
AT-20
-20 dB
(red)

Both resistors are
210 Ohm 1%



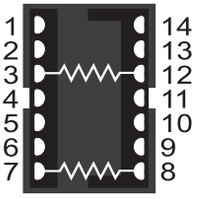
AT-25
-25 dB
(green)

Both resistors are
63.4 Ohm 1%



AT-35
-35 dB
(yellow)

Both resistors are
19.1 Ohm 1%



AT-45
-45 dB
(orange)

Output Board

4.1 Overview

This circuit board provides the following console functions:

- Line output amplification
- Cue amplification
- Headphone amplification
- External Inputs
- Monitor sends
- Meter and peak LED functions
- Level sets for all functions
- Muting and timer reset functions
- Power supply interface
- Talk back circuitry

Illustration O-1 provides a complete layout of all connectors, level set locations, and all user connector pin-outs for the 5-pin version console. Illustration O-2 has the same information for the RJ-45 version console

4.2 Audio Circuitry

4.2.1 Program and Audition Outputs

The program and audition outputs provide identical stereo performance, are active balanced, and factory calibrated, with a 600 ohm load, to provide +4dBm when the front panel VU meters read “0” VU. This will provide in excess of 20dB of headroom. Adjustments for output levels, meter calibrates, and peak LED trip points are provided on the Output Board, so that other output levels maybe set.

The outputs will drive a 600 ohm load or higher. The outputs connectors are mounted on connectors J30 (PGM), and J29 (AUD), located on the Output Board.

It is recommended that two conductor shielded cable, or two pair shielded cable be used in wiring all balanced audio inputs to the console. Use STP (shielded twisted pair) patch cords when wiring the RJ-45 version. To minimize RF interference and ground loops, the shields should be tied to ground only at one end of the cable.

If an unbalanced console output is required, single conductor shielded cable or two conductor shielded cable with a foil shield around each conductor should be used. The audio should be taken from the + Output terminal, while the shield should be connected to Ground. In this case, the shield is connected at both ends of the cable. There should be no connections to the - Output. In this configuration, the console output will provide -2dBm into a 600 ohm load when the front panel VU meters read “0” VU.

4.2.2 TEL (Telephone) Output

The mono TEL Output is located on connector J33 on the output board.

The two TEL Outputs provided are in parallel, from the same amplifier. The combined load on the amplifier from both mono sends should be no less than 600 ohms.

In other aspects, the performance and connections to the TEL Output are identical to the PGM and AUD outputs.

4.2.3 External Monitor and Headphone Inputs

Four balanced, stereo, high impedance (4.7K ohm) inputs are provided which feed both the headphone and the monitor amplifiers. These inputs are located on connectors J19 (EXT IN 1), J20 (EXT IN 2), J25 (EXT IN 3), and J26 (EXT IN 4) on the Output Board.

Two conductor shielded cable with a foil shield around each conductor or STP RJ-45 patch cords should be used.

These inputs are intended mainly for air signal monitors, or for the connecting of other external monitor sources. Input level trims for each of these inputs are provided on the Output Board.

4.2.4 Headphone Outputs

Two headphone outputs are provided. The first is available at a stereo, quarter inch, phone jack which is factory mounted to the front panel. This output is capable of driving 8 ohm or greater loads. D0 NOT USE MONO HEADPHONES. The output signal is selected by the front panel headphone or monitor switches and level adjusted by the front panel headphone level control.

The second headphone output is stereo, balanced, and high level (lv RMS typical). It will drive loads of 2K ohms or greater. This output, which is intended for connection to an external headphone amplifier, follows the input selection switches but is not affected by the front panel headphone level control.

The connector for the headphone output is located on J11 on the output board.

Single conductor shielded cable or two conductor shielded cable with a foil shield around both conductors should be used.

4.2.5 Monitor Sends

Three stereo, balanced, high level (lv RMS typical) are provided. Each output will drive loads of 2K ohms or greater. The outputs are Dimmed

Monitor (controlled by Mute 1), Muted Monitor (controlled by Mute 2), and Unmuted Monitor. All outputs follow the monitor selection switches but only the Dimmed Monitor is affected by the front panel monitor level control.

Connectors are located on the Output Board as follows.

Output Board Header	Monitor Output
J12	Dimmed Monitor (Mute 1)
J15	Muted Monitor (Mute 2)
J16	Unmuted Monitor

Single conductor shielded cable or two conductor shielded cable with a foil shield around both conductors, or STP RJ-45 patch cords, should be used.

All monitor outputs are intended to drive external monitor amplifiers. The Dimmed Output, controlled by Mute 1, (which also mutes the Cue speaker) is intended to feed the control room monitor amplifier where the console is located. When the Mute 1 bus is enabled, the output from the Dimmed Output will be reduced to a level set by VR13 located on the Output Board. This level may be set to maximize (for full muting) or, alternatively, to a level just below the feedback threshold of the speakers.

The Muted Output is intended to feed any other room which that contains microphones connected to the console.

If it is desirable to feed all studios from a common amplifier, this amplifier should be fed from the Unmuted Monitor Output. External relays driven by the muting contacts on header J7 could then be used to provide the necessary muting of the signal.

4.3 Control Wiring

4.3.1 Mute and Timer Reset Bus Connections

A five position quick-connect type barrier strip maybe mounted onto Mute/Timer header J7 on the Output Board to provide external mute and timer reset functions.

The bus outputs are open collector current sinking outputs, maximum +24vdc open circuit voltage, 80ma. If the buses are to drive external relays, install EMF suppression diodes across the relay coils. Do not exceed 150ma draw from the +15v supply.

An interface relay is optionally available from Radio Systems. Illustration O-3 shows the wiring of this relay for external tally lights.

The Timer Reset Bus activates only during the first 100ms after a mixing channel, with its Timer Reset Jumper(s) installed, is placed in the “on” mode. Repeated depressing of the “on” switch after the mixing channel has turned “on” will result in additional pulses on the Timer Reset Bus.

4.4 Talk Back Connections

The talk back circuit has two sections, send and receive. The send section will output any signal applied to its input when the front panel Talk Back Switch is depressed. Return signals are applied to Cue Bus for operator monitoring. A trim pot on the Output Board is provided to set the external cue input level.

Talk back connections are made via 2 five position terminal strips, titled to Talk Back Output header J36 and Talk Back Input header J37 on the Output Board.

Under normal applications, the output of the DJ mic is wired to the talk back send input terminal on J37. This is accomplished by connecting terminal 4 from patch point connector J8 of the DJ mic channel to terminal 1 of the Talk Back connector, and shorting terminal 2 (-) of the Talk Back Connector to terminal 3 (G).

Talk Back Output connector J36 also contains terminal 4 labeled “CTL”, which is pulled low whenever the front panel talk back switch is depressed. This is useful for switching external intercom or control circuits. It may also be used to remote trigger the console front panel Talk Back switch.

Illustration O-4 shows how this configuration would be used to wire two Millenium Consoles for talk back communication utilizing the DJ mic channel and cue circuit external inputs.

4.4.1 Intercom

The talk back system can also be used to communicate with up to four 2-way speakers in studios or control rooms that do not have Millenium Consoles. For this application, Radio Systems provides an Intercom card. Consult Illustration E-6 in the Interface Options and Accessories section of this manual for detailed information.

4.5 Internal Adjustments and Input Level Calibration

The following level trim adjustments are available internal to the console.

1. mix bus output level
2. VU meter “0”
3. peak LED trip point
4. input level for external monitor inputs
5. input level for external cue bus input
6. distortion adjustment for all VCAs

The console was factory calibrated as follows, and will not require re-calibration unless alternate levels are desired.

1. With a +4dBv input and the fader set to the “0” position, the console will provide +4dBm output into a 600 ohm load.In addition, the VU meters will read 100% or 0 VU.
2. The peak LED trip point was calibrated to illuminate the LED when the peak output level reaches +2 dBv.
3. The external monitor inputs were calibrated to provide a lv RMS output with a lv RMS input.

4.5.1 Mix Bus Output Level Adjust

The console was calibrated at the factory for an output level of +4dBv, into 600 ohms, when the VU meters indicate “0”.

Perform the following steps on the Six Channel Audio Board to verify or change the calibration.

1. Select a high level input with no DIP component carrier inserted into attenuator headers J3 or J4. In addition, there should be no jumpers installed onto gain select headers J5 or J6.
2. Disconnect any inputs to the left or right A input.
3. Connect a l kHz, +4dBv, balanced sine signal to both the left and right A inputs.

Select input A, select all mix buses, turn the mixing channel “on”, and set the fader to “0”.

Perform the following steps on the Output Board.

1. If the console outputs will normally be terminated, place an equivalent termination onto each program and audition output. In addition, place a termination onto one of the Mono outputs.
2. Connect a high impedance, balanced voltmeter across the + and - Left program output.
3. Adjust the left channel output level trimmer so that the voltmeter indicates the desired output.

4. Move the voltmeter, and adjust the right program output, followed by the left audition output, right audition output and mono output.

4.5.2 VU Meter “0” Calibration

The console was calibrated at the factory for an output level of +4dBv, into 600 ohms, when the VU meters indicate “0”.

To calibrate the VU meter “0” indication:

1. Perform output level calibration as detailed previously.
2. Adjust the VU meter calibrate trimmers, located on the Output Board for a “0” reading on each meter.

Note: Six channel consoles share the same meters for program and audition monitoring. The front panel VU meter switch selects the signal to be displayed. Adjustment must be made with both switch settings.

4.5.3 Peak LED Trip Point Calibration

The console was calibrated at the factory for an output level of +4dBv, into 600 ohms, when the VU meters indicate “0”, and for a peak LED trip point of +2VU. To perform Peak LED Trip Point Calibration:

1. Perform output level calibration as detailed previously.
2. Perform VU meter “0” calibration as detailed previously.
3. Adjust oscillator to the desired peak LED trip point level (typically 0 to 3dB hotter).
4. Adjust the peak LED trip point trimmers to that the LEDs just illuminate.

Note: Six channel consoles share the same meters for program and audition monitoring. The front panel VU meter switch selects the signal to be displayed. Adjustment must be made with both switch settings.

4.5.4 External Monitor Input Level

There is a separate adjustment, located on the Output Board for each of the four stereo external inputs.

1. Connect a high impedance voltmeter to the unmuted monitor output.
2. Select a high level input, and reproduce the nominal level from a test tape, record or CD.
3. Turn the mixing channel “on”, select the program mix bus, and adjust the fader for “0” VU.
4. Depress the “program” monitor input switch.
5. Note the reading on the voltmeter.
6. Feed the nominal input level to any external input and select that monitor input switch.
7. Adjust the associated external input level trimmer until the voltmeter gives the same indication as in step 5.
8. Repeat steps 6 and 7 for all external inputs.

4.5.5 Cue Bus External Input Level

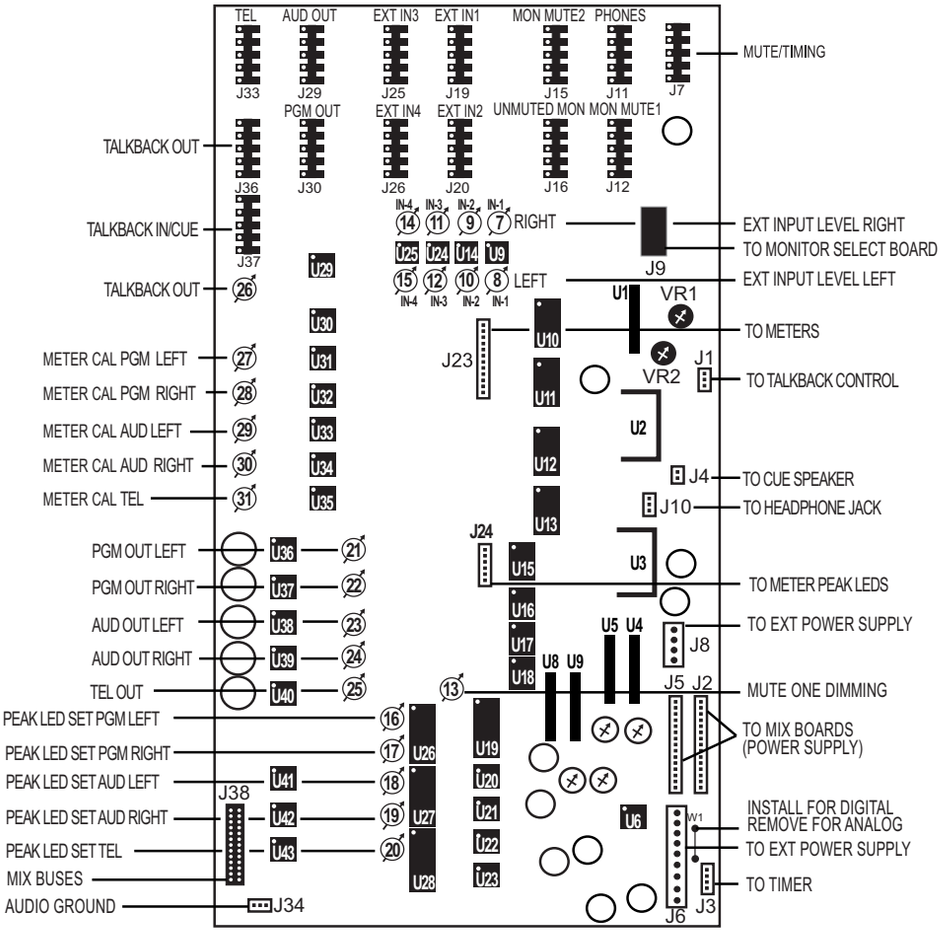
The level adjustment for the external cue bus input is located on the Output Board.

1. Connect a high impedance voltmeter to the external cue speaker terminals.
2. Select a high level input, and reproduce the nominal level from a test tape, record or CD.
3. Place the mixing channel into “cue”, and adjust the cue level control VR2 for normal listening level.
4. Note the reading on the voltmeter.
5. Feed the nominal input level into the external cue input.
6. Adjust the external cue input level trimmer until the voltmeter gives the same indication as in step 4.

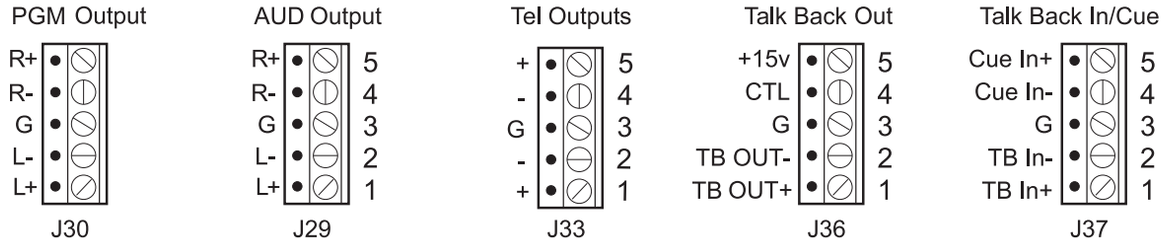
4.5.6 VCA Distortion Null Adjustments

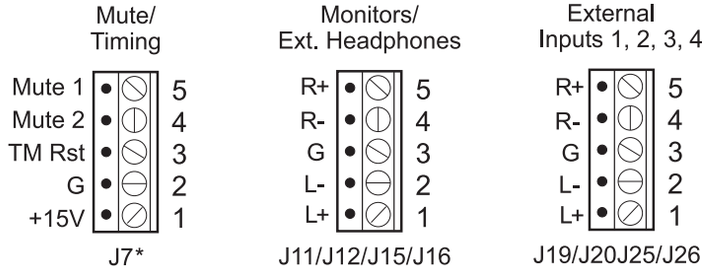
These adjustments are factory set and should only require adjusting if a VCA is replaced. Consult the Theory of Operation and Troubleshooting Section for detailed directions.

Illustration O-1
Output and Meter Board - 5 Pin



Connectors

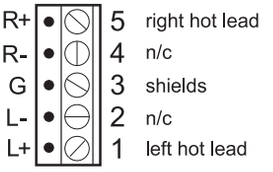




*The support bracket for the upper **DIGITAL** output board may obscure plugging into J7 as illustrated. Plugging in this connector on its side (with wire entry holes pointed up) will ease installation.

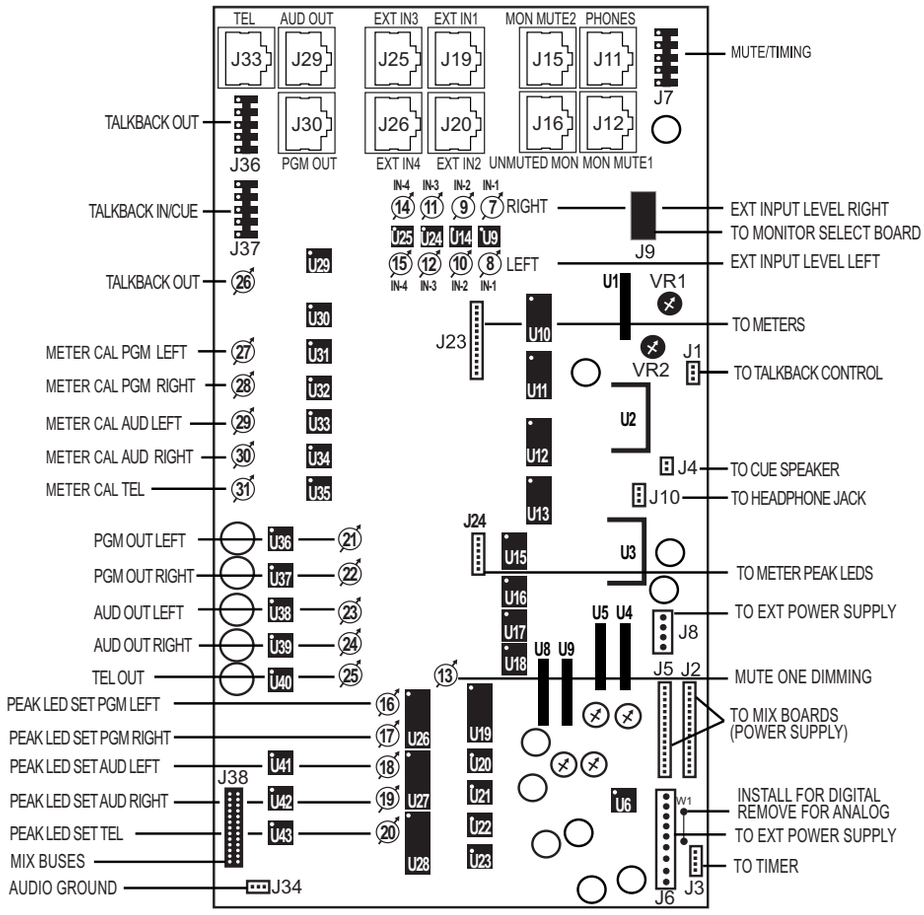
Access trim pots via silk-screen legend holes on the upper **DIGITAL** output board with the provided small screw driver.

WIRING UNBALANCED AUDIO OUTPUTS



*Wire outputs to unbalanced equipment by connecting to the plus pins 1 and 5 and ground. Make no connection to negative pins 2 and 4.

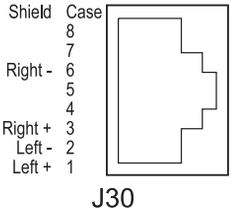
Illustration O-2
Output and Meter Board - RJ-45



Note: Access trim via silk-screen legend holes on the upper DIGITAL output board with a small screw driver

Connectors

PGM Output



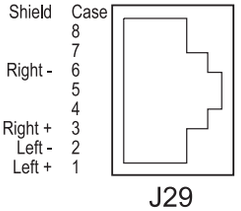
J30

Mute/Timing

Mute 1	5
Mute 2	4
TM Rst	3
G	2
+15V	1

J7*

AUD Output



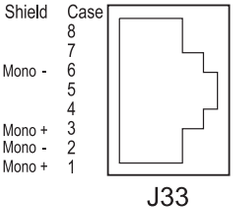
J29

Talk Back Out

+15v	5
CTL	4
G	3
TB OUT-	2
TB OUT+	1

J36

TEL Output



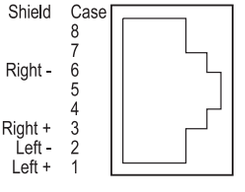
J33

Talk Back In/Cue

Cue In+	5
Cue In-	4
G	3
TB In-	2
TB In+	1

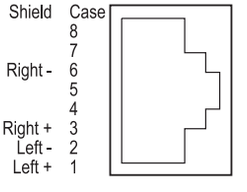
J37

Monitors/ Ext. Headphones



J11/J12/J15/J16

External Inputs 1, 2, 3, 4



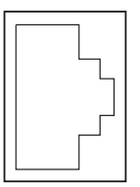
J19/J20J25/J26

*The support bracket for the upper **DIGITAL** output board may obscure plugging into J7 as illustrated. Plugging in this connector on its side (with wire entry holes pointed up) will ease installation.

Access trim pots via silk-screen legend holes on the upper **DIGITAL** output board with the provided small screw driver

WIRING UNBALANCED AUDIO OUTPUTS

shields	Shield	Case
		8
		7
n/c	Right -	6
		5
		4
right hot lead	Right +	3
n/c	Left -	2
left hot lead	Left +	1



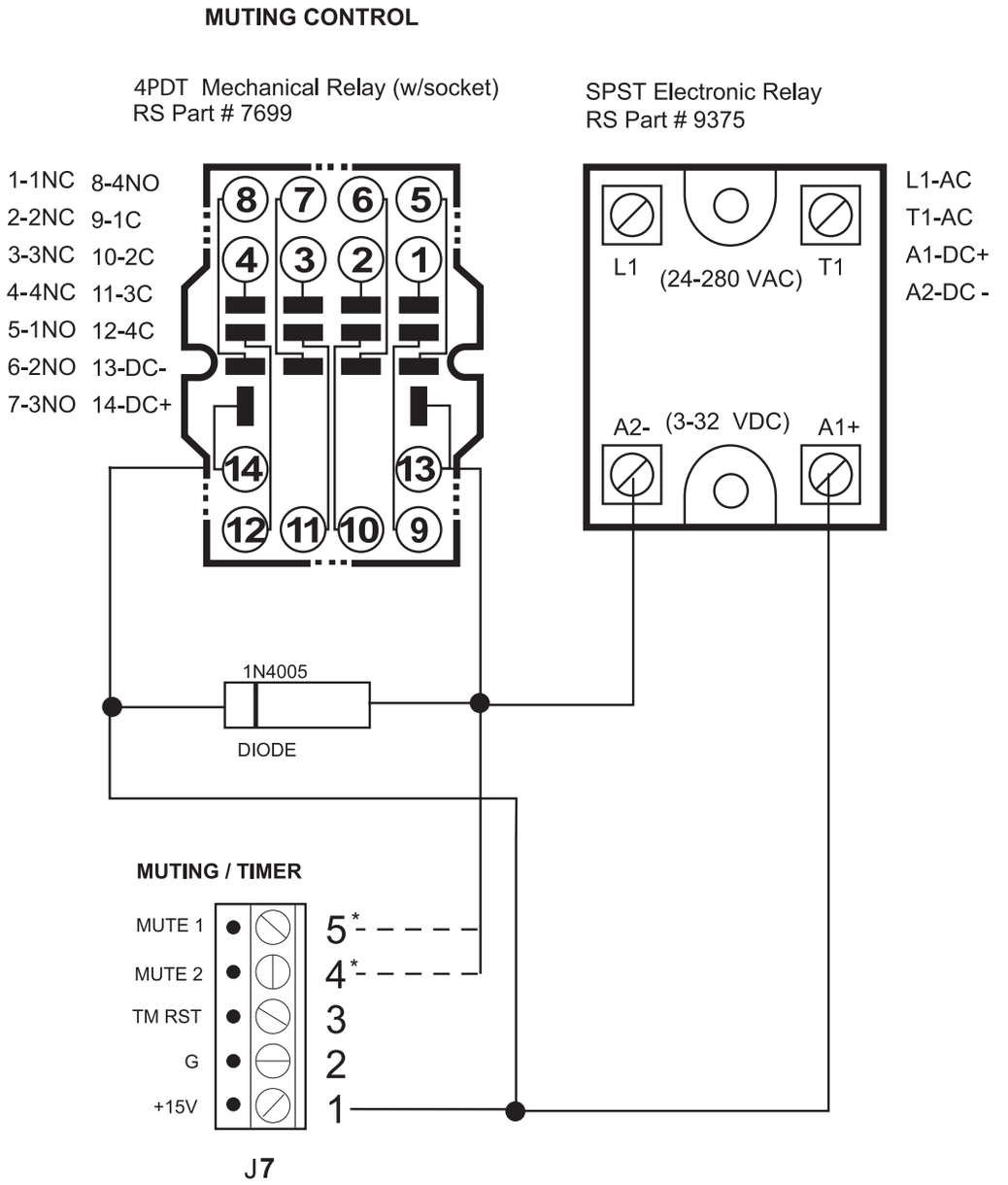
*Wire outputs to unbalanced equipment by connecting to the plus pins 1 and 3 and shield. Make no connection to negative pins 2 and 6

Illustration O-3
Auxiliary Control Relay Wiring

Connect the auxiliary relay (optional) (RS part #7699) to the console muting connector as shown below for mute-1 or mute-2 control of air lights and other outboard equipment.

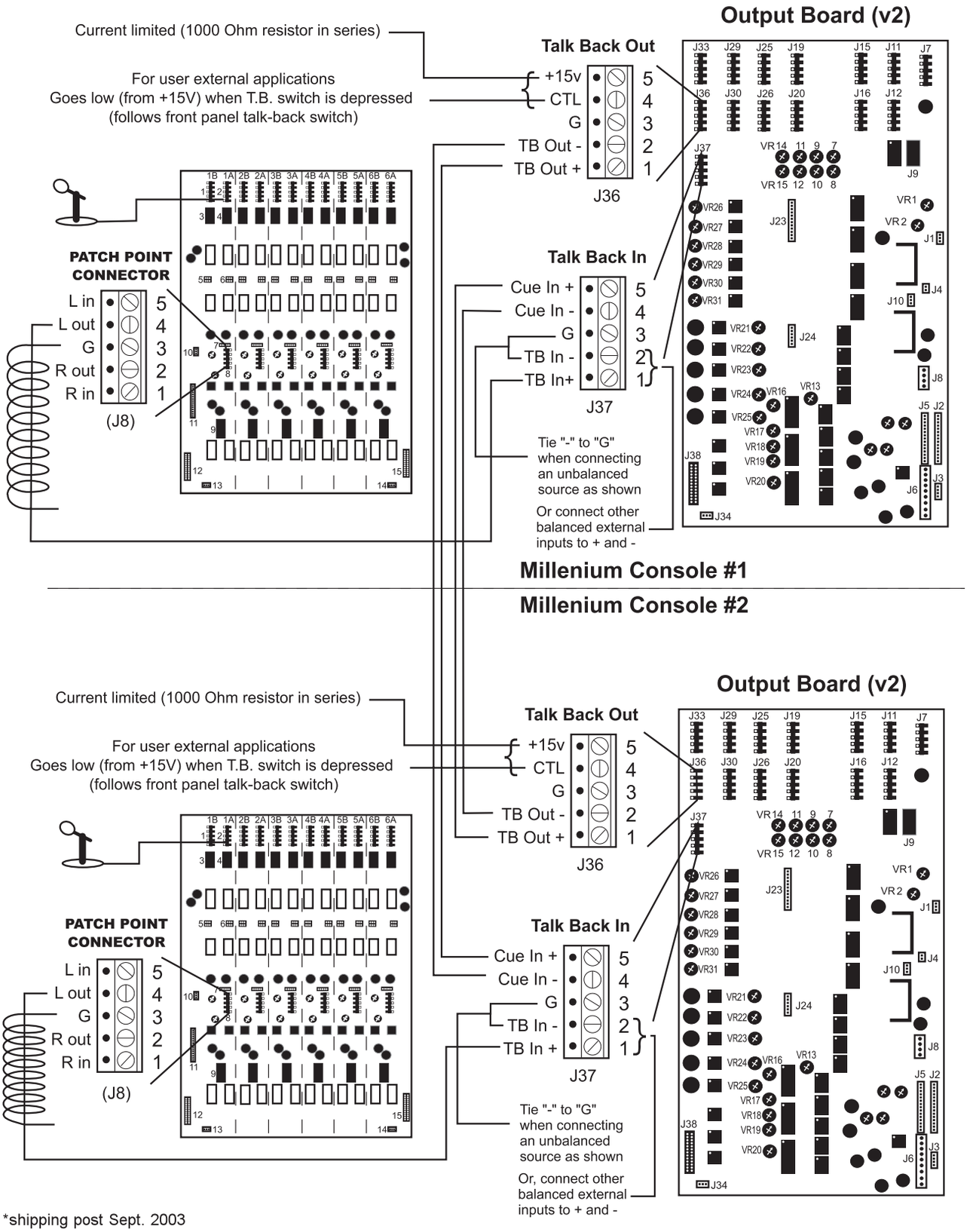
A solid-state model of this relay (RS part #9375) is also available. Note that this part is only supplied in single pole (SPST) configuration.

IMPORTANT NOTE: Take extreme care in wiring this relay to console connector J7 to ensure that no hazardous (110V) voltage is applied to pins on this connector.



*Note: Connect to pin 5 for Mute 1 Control
Connect to pin 4 for Mute 2 Control

Illustration O-4
Talkback Wiring



*shipping post Sept. 2003

Interface Options and Accessories

5.1 Overview

Several optional interface cards are available for the Millenium-A consoles. These options include:

Enhanced Remote Interface Card - This card connects any input channel's 15-pin remote connector to provide relay and opto-isolated channel on/off and start/stop control.

Selector Logic Card - This card adds control logic to the 8 switches located to the right of the monitor section.

Four Source Router Card - This card routes 4 balanced stereo inputs to a single stereo output, which can then be routed to any standard console input. This option card **requires** the Selector Logic Card.

DA-Mixer Card - This card can be configured as two stereo 1x2 distribution amplifiers (eg. creating two PGM and AUD outputs), or as one stereo 1x4 distribution amplifier. Additionally, this card can be used to create special mixes through the use of jumpers (eg. to create two mix-minuses for two single line telephone hybrids.

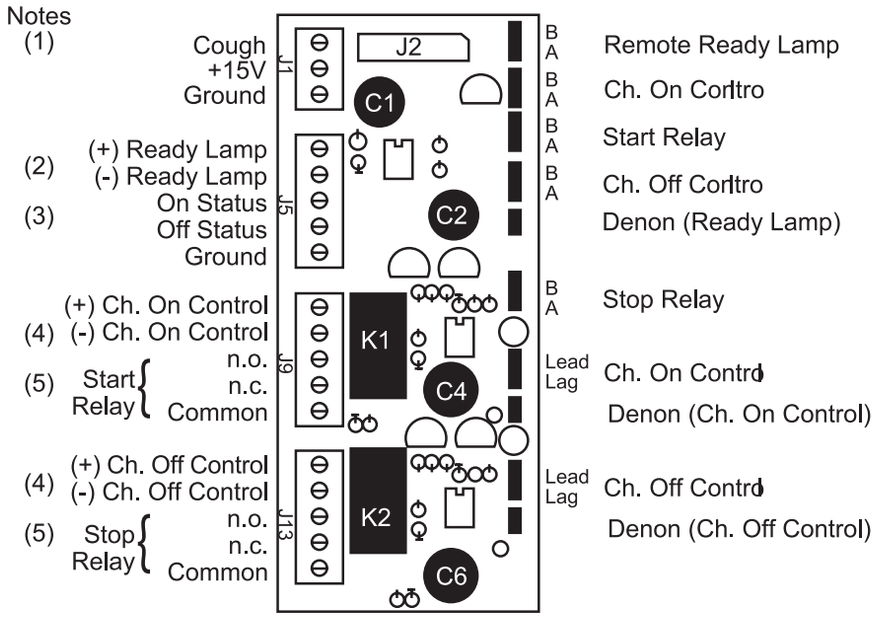
Intercom Card - This card enables talkback connection between multiple Millenium consoles and/or standalone intercom stations. See section 5.2 for detailed operational information.

Illustration E-1
Enhanced Remote Interface Card

Description

This option card connects to any input channels' 15-pin remote connector to provide relay and opto isolated channel on/off and start/stop control.

Jumpers are also provided to program various enhanced logic states.



Remote Wiring Notes

(1) Connect and hold "cough" and +15v pins to hold the channel off.

(2) Apply from +5v to 24v DC to these leads to illuminate the channel off lamp.

(3) These leads go low to indicate channel on or off state.

(4) Apply from 5v to 24v DC these leads to turn the channel on or off.

(5) Relays pulse or hold close when channel turns on or off.

Programming Notes

A/B jumpers - short upper 2 pins for input B control, or short lower 2 pins for input A control of associated function.

Lead/lag jumpers - short upper 2 pins for leading control, or short lower 2 pins for lagging control of remote channel On or Off control.

Denon CD Players - insert these 3 jumpers to adjust card timing pulses to utilize in conjunction with Denon model 950FA CD cart machines.

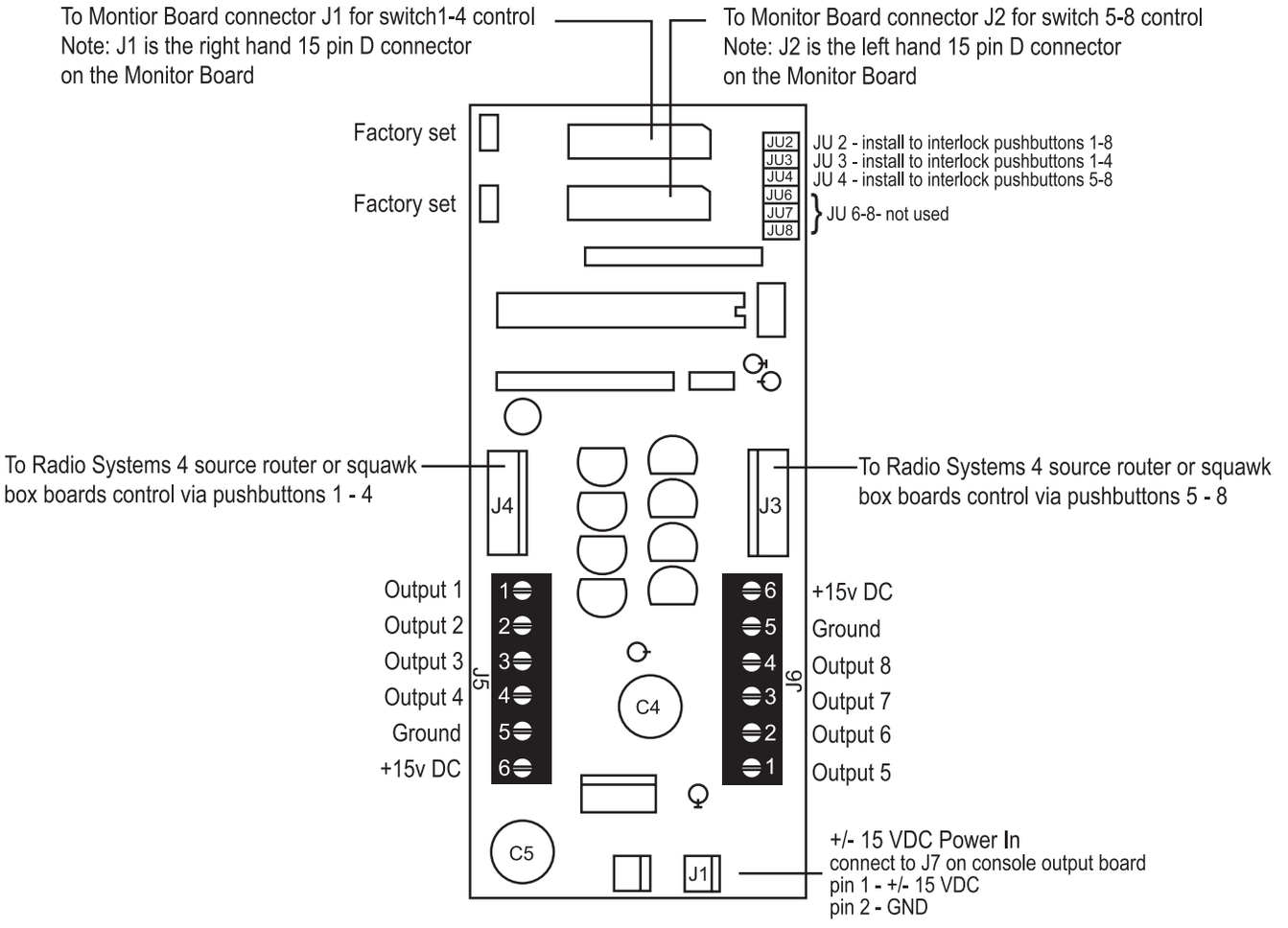
Installation Notes

When ordered with the console, this optional board wilt normally be factory installed and operational. For field installation, use the four plastic stand-oils provided to mount the board on the inside rear console wall near the associated input and output. Use the cable provided to wire the Remote Board(s) to the desired console channel remote control D connector via on-board connector J-2.

Illustration E-2
Selector Logic Card

This option card adds control logic to the 8 switches located to the right of the monitor section. Added and programmable logic functions include:

-Push-on / Push off (independent latching switch)
-Interlocking as one of four, or one of eight switch sets
-Lamp follow logic



Outputs are open collector, pull-to-ground. The output goes low and will stay low as long as the associated switch LED is illuminated.

Installation Notes

When ordered with the console, this optional card will normally be factory installed and operational. For field installation, use the four plastic stand-offs provided to mount the card on the inside rear console wall near the associated input or output.

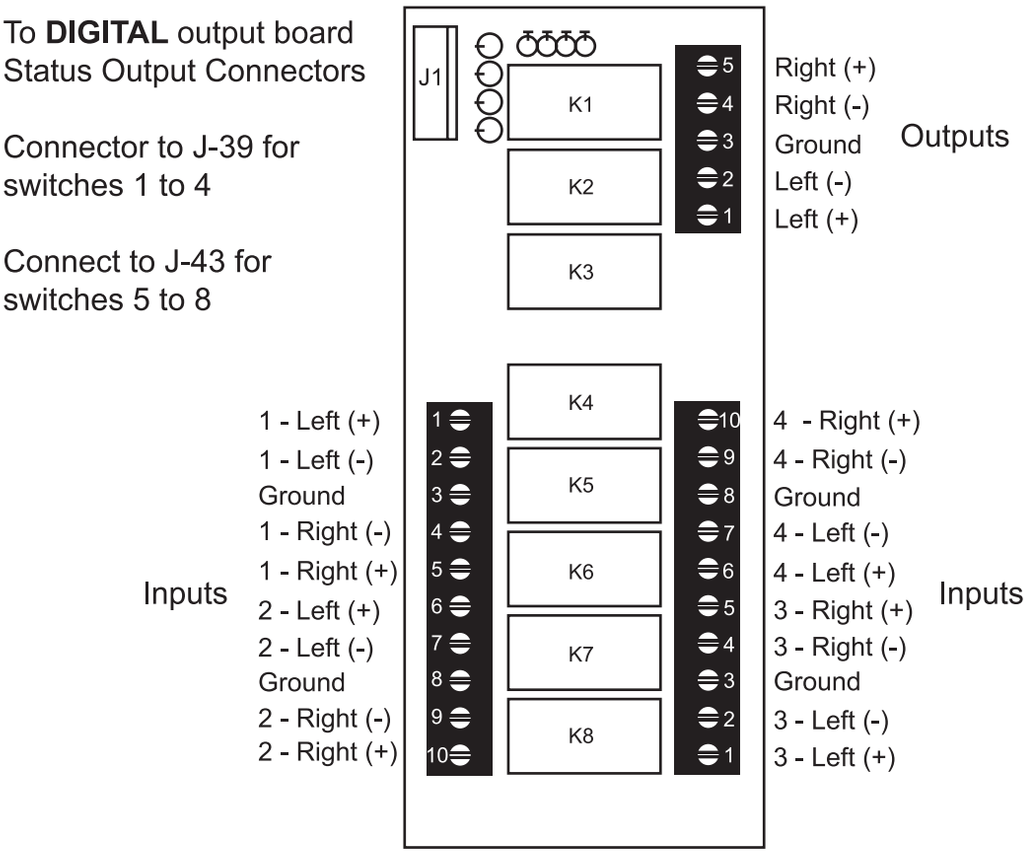
This card may be installed and used independently by connecting to the output barrier strips or, as a logic controller for any combination of two Radio Systems' Squawk Box or Four Source Router Cards. Connection to these cards is via connectors J3 and J4 using the control cables provided with the option cards.

Illustration E-3
Four Source Router Card

This optional card is a 4x2 balanced stereo router which can be used bi-directionally. That is, the board can be used to route 4 balanced stereo sources to one stereo input, or direct one stereo output to any one of four stereo inputs.

Because all switching is via relay contacts (passive), multiple router boards can be "daisy chained" by connecting the router outputs in parallel to create an 8x2 (or larger) matrix.

The four source router board is designed to be controlled by the Radio Systems selector logic board, which interfaces one or two 4 source router boards to the Millenium console front panel selector switches.



Installation Notes

When ordered with the console, this optional board will normally be factory installed and operational. For field installation, use the four plastic standoffs provided to mount the board on the inside rear console wall near the associated input or output.

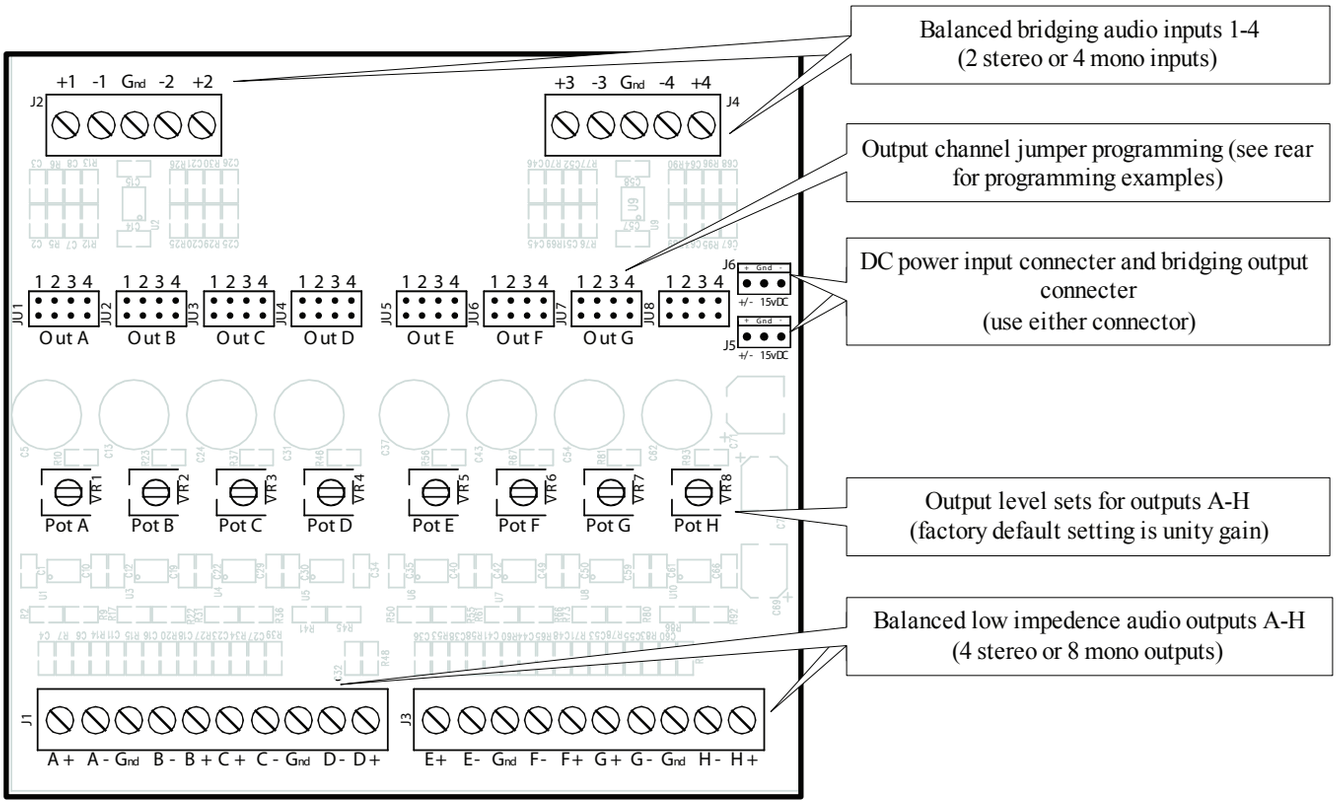
Two cards may be installed as above independently and used as two 4x2 routers, or used in tandem to create a 8x2 router by connecting the outputs in parallel.

Illustration E-4
DA-Mixer Card

Description
This optional, compact circuit card installs internally in Millenium consoles and may be connected to any console audio output(s) to distribute signal to multiple sources. The card features bridging inputs, low impedance outputs, and independent level adjusts for each output.

Installation
Use the plastic pins supplied to mount the circuit card on any free slot on the console inside rear wall. Supply DC power via the three wire cable from any auxiliary DC output connector on any lower console circuit board. The second DC connecter can be used to supply DC to power additional console option boards.

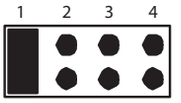
Applications
Use the DA/MIXER to distribute program or audition audio, create a mono program blend or a "mix-minus" feed of multiple signals. On analog Millenium consoles, the DA/MIXER may also be wired to loop through channel patch points (while leaving the loop-through jumpers in place) to "pick-off" and distribute individual channel audio. The DA/MIXER, used in this application, will balance and buffer the audio, maintaining the integrity of channel audio as it exits the console.
Each of the 8 outputs can be jumper programmed to deliver one or any mix of the 4 inputs. Thereby, multiple stereo outputs can be created by jumpering one input to multiple outputs. A mono mix of stereo inputs can be created by jumpering a signal output to multiple inputs. A "mix-minus" output can be created by jumpering one input to multiple outputs with additional inputs to the same outputs.


Balanced bridging audio inputs 1-4
(2 stereo or 4 mono inputs)
Output channel jumper programming (see rear for programming examples)
DC power input connecter and bridging output connecter
(use either connector)
Output level sets for outputs A-H
(factory default setting is unity gain)
Balanced low impedence audio outputs A-H
(4 stereo or 8 mono outputs)
+1 -1 Gnd -2 +2
+3 -3 Gnd -4 +4
J2
J4
JU1 JU2 JU3 JU4 JU5 JU6 JU7 JU8
1 2 3 4
Out A Out B Out C Out D Out E Out F Out G
J6
J5
+/- 15vDC
VR1 VR2 VR3 VR4 VR5 VR6 VR7 VR8
Pot A Pot B Pot C Pot D Pot E Pot F Pot G Pot H
J1
J3
A+ A- Gnd B- B+ C+ C- Gnd D- D+
E+ E- Gnd F- F+ G+ G- Gnd H- H+

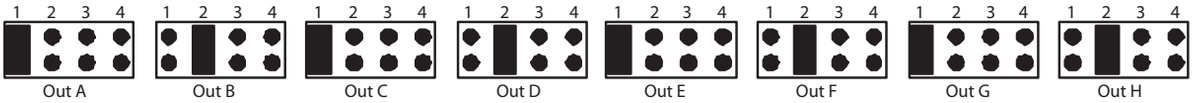
When ordered with the console, this optional board will normally be factory installed and operational. For field installation, use the four plastic standoffs provided to mount the board on the inside rear console wall near the associated input or output. Connect the 3-pin power connector to any available 3-pin power port (+/-15v DC & Ground), on any lower console circuit board.

Illustration E-5
DA-Mixer Programming Examples

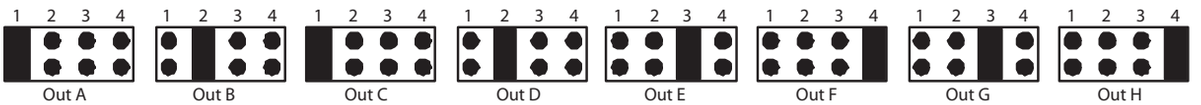
Various Output Configurations and Applications
for the Radio Systems DAMIXER Console Option Card



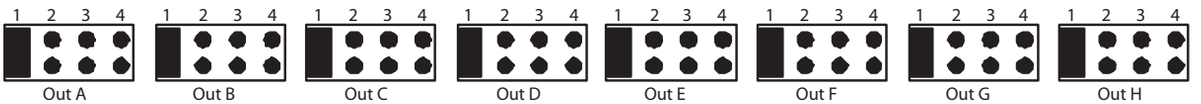
Output Programming Jumpers JU1-JU8
(black over pin 1 indicates user installed jumper)



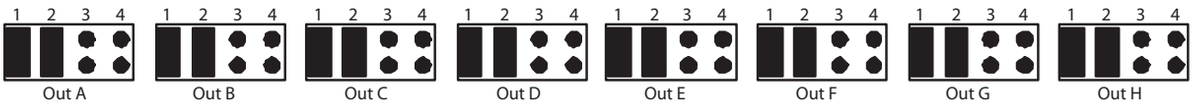
Stereo DA - 1x4
Single stereo input (1/2) to 4 stereo outputs (A/B, C/D, E/F, G/H)



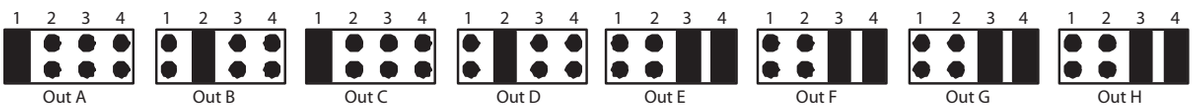
Dual Stereo DA - 2x2
Dual stereo input (1/2)+(3/4) each to 2 stereo outputs (A/B, C/D)+(E/F, G/H)



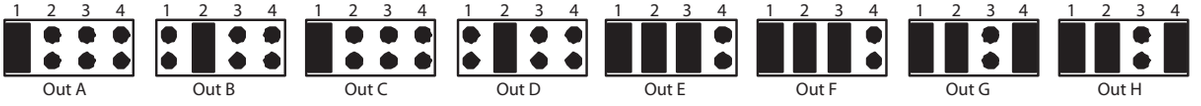
Mono 8 Output DA - 1x8
One mono input (1) to 8 mono outputs (A.B.C.D.E.F.G.H)



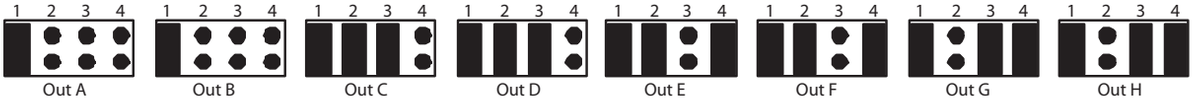
Stereo Summing 8 Output DA - 2x8
One stereo input summed to 8 mono outputs



Stereo DA - 1x2 / Mono DA - 1x4
One stereo input (1/2) to 2 stereo outputs (A/B,C/D) and one stereo input (3/4) mixed to 4 mono outputs (E,F,G,H)



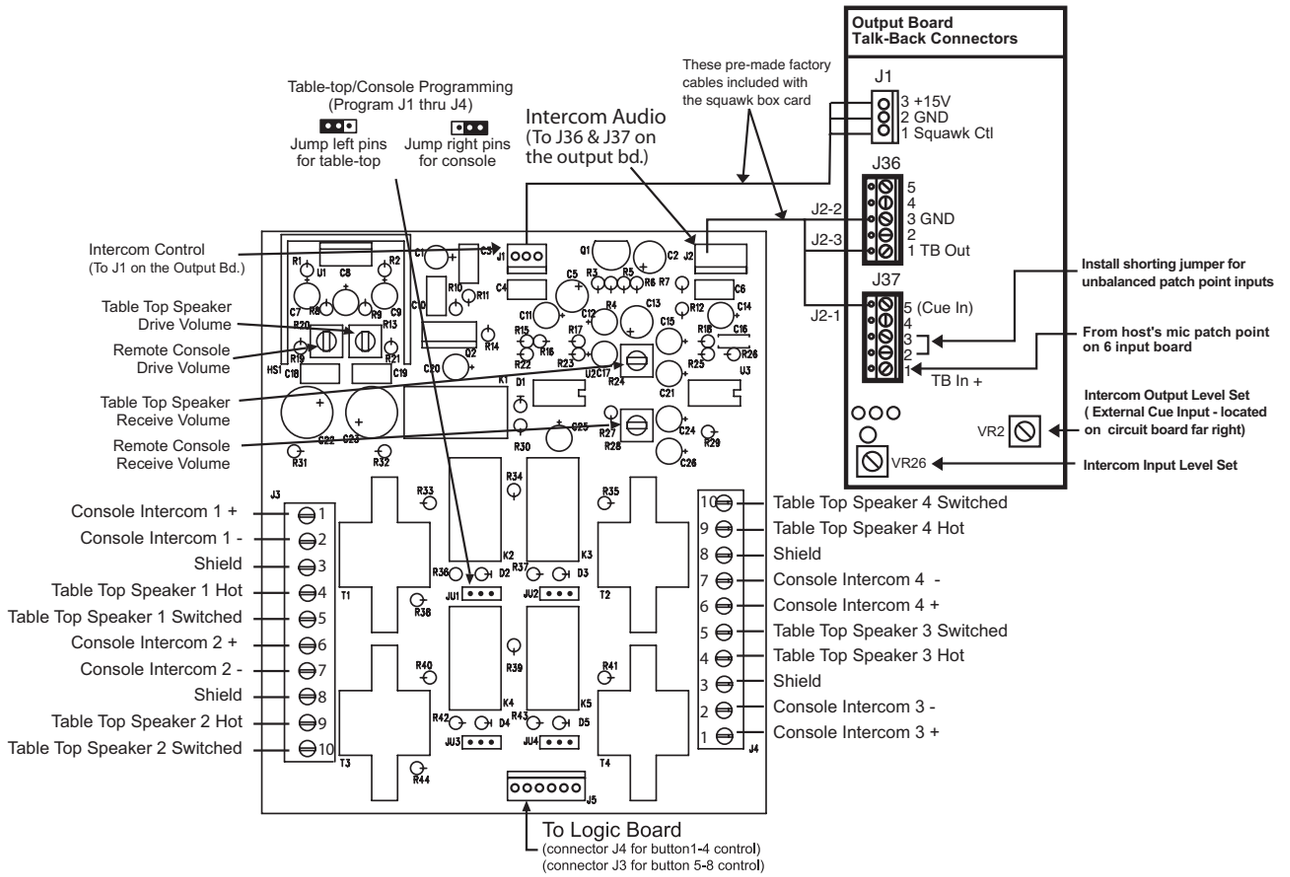
Stereo Program with 2 Summed Mix-Minus outputs - 1x2 with 3 Mix-Minus
One stereo input (1/2) to 2 DA outputs (A/B,C/D) plus two mix-1 outs (E,F) and two mix-2 outs (G,H)



Mono Program with 3 Mix-Minus Outputs - 1 with 4 Mix-Minus
One mono input (1) to 2 DA outputs (A,B) plus three sets of mix-1, mix-2, and mix-3 outputs (C,D/E,F/G,H)

Illustration E-6
Intercom Card Wiring

To interconnect the Intercom Card to Radio Systems' Millenium Analog Consoles



Wiring

1. Connect operators mic loop thru point (or other line level source) to output board talk-back input (J37 pins 1 & 2).

2. Connect provided patch cables from squawk box card to output board (control cable from squawk back card J1 to console connector J1 and the audio cable from squawk box card J2 to console conenctors J36 & J37).

3. Install provided cables to connect J3 (talkback control) and J4 (logic board). However, a factory tech. note is available for field modification for single unit (no logic board required) operation.

4. The Intercom Card has 4 identical I/0 Sections. Each can host either a table-top speaker or another console that has been fitted with an intercom card.

5. Connect speakers to terminals labeled "table-top speaker hot" and "table-top speaker switched" (1-4). Use shielded cable. Consult interconnection diagram on next page for hook-up. Select table-top speaker on console selector buttons for hands-free mode. Table-top speakers can "call" the console via call button.

6. Connect up to four console intercoms to terminals labeled "console intercom +" and "console intercom -". Consoles must select each other to establish a push-to-talk pathway.

7. A maximum of four stations (any combination of table-top and console units) may be connected.

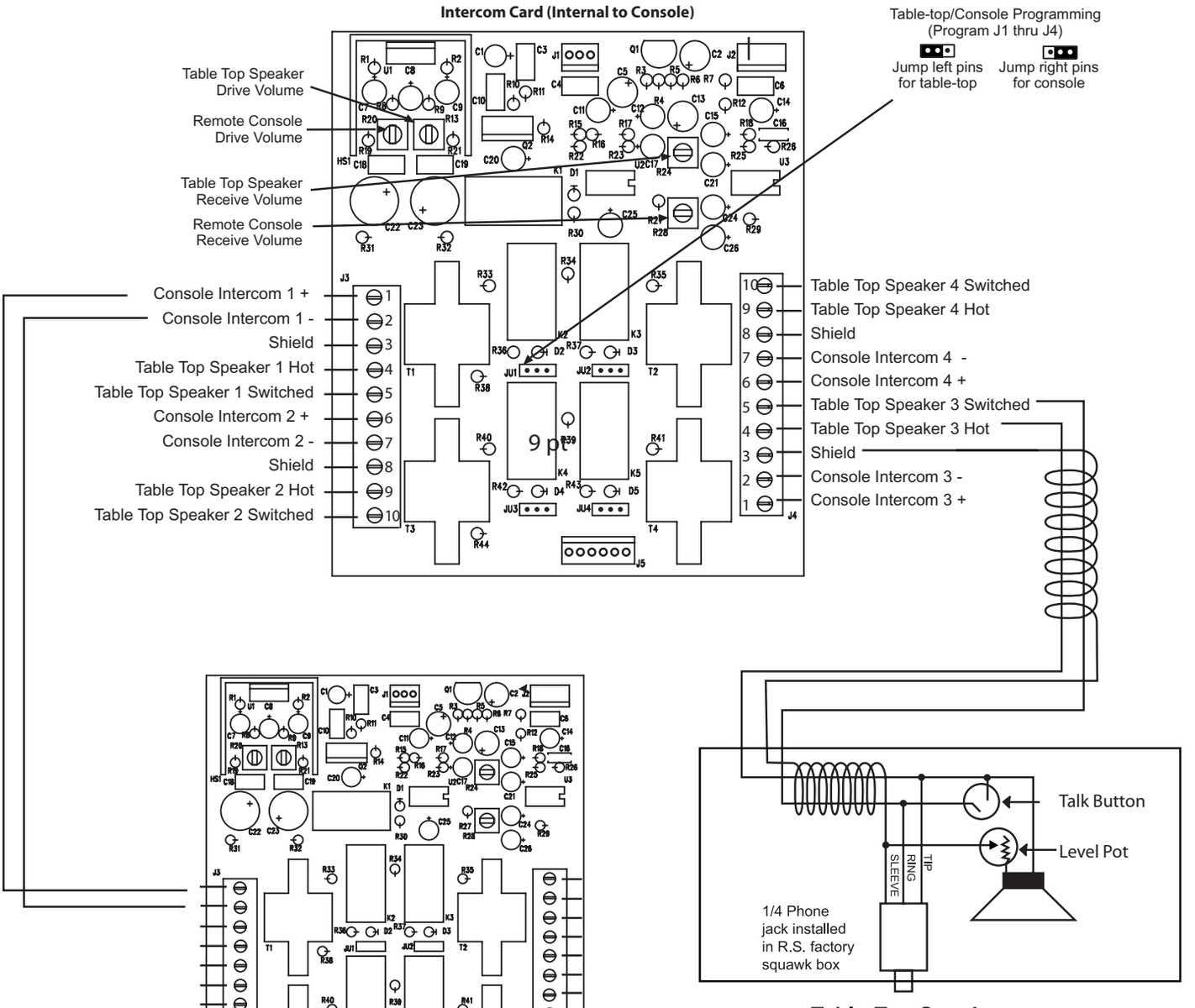
8. J1 thru J4 must be programmed to select a console or table-top speaker for each channel.

9. Set VR2 for Intercom output level and set VR26 for Intercom input level

Installation

When ordered with the console, this optional board normally will be factory-installed. For field installation, use the four plastic stand-offs provided to mount the board on the inside rear console wall near the associated connectors. Wire with supplied harness cables. Install provided cables to connect J2 (audio in and out), J3 (talkback control) and J4 (logic board). However, a factory tech. note is available for field modification for single unit (no logic board required) operation.

Illustration E-7
Intercom Card Table-Top Speaker & Console Interconnection



Note:
Use shielded cable when making connections.

Be certain to perform J-1 thru J-4 programming to set table-top or console operation.

Connect up to four table-top or console intercoms in any combination. (Only one of each can be connect to any channel)

5.2 Intercom Card Overview

The Intercom is an optional accessory for the Millenium broadcast consoles. The card provides 2-way amplification for connection of the console to any combination of four speakers or Radio Systems' consoles. One or two cards may be installed in a console to service four or eight stations.

5.2.1 Operation

1. With a table top speaker (Radio Systems Part #7696)

   To page and speak from the speaker to the console, push and hold the button on the speaker.

   To respond to or call the speaker from the console, select the speaker location on the console 4/8 position selector and push and hold the talkback button.

   Release the talkback button to allow the speaker location to respond hands free.

   Deselect the speaker location on the 4/8 position selector to hush the listen path.

2. Between two consoles

   Select the console you wish to communicate with on the 4/8 position selector.

   Push and hold the talkback button to page and speak to the selected console.

   To respond, the selected console must select the paging console on the 4/8 position selector, (if it is also equipped with a intercom card) and push and hold the talkback button.

   Push-to-talk conversation may continue between the consoles. Console operators should deselect the console on the 4/8 position selector when the conversation is complete.

5.2.2 Installation and Wiring

Use the plastic stand offs provided to mount the intercom card and the logic selector card (required and utilized only in Millenium consoles) next to each other on the inside back wall of the console behind the output board.

5.2.2.1 Control Wiring

Connect provided cables from intercom card to output board (control cable from intercom card J1 to console connector J1.

The eight position switcher must be programmed for interlocked operation. See Illustration E-2 for programming the Selector Logic Card.

5.2.2.2 Intercom card audio wiring

Connect the audio cable from intercom card J2 to console connectors J36 and J37.

Connect the 4-conductor audio cable between intercom card connector J2 and output board Talk-Back audio connectors J36 & J37. (For RS Series consoles only – connect J4 to the 4-position front panel mechanical switch.)

5.2.2.3 Console internal wiring

Connect operator's mic loop thru point (or other line level source) to output board talkback input (J37, pins 1&2).

5.2.2.4 Table-top speaker wiring

Utilize up to 300' of 2-conductor shielded cable. At the intercom card, connect the shield to GRND, the tip from the phone plug (switch output) to call, and the ring to the other side of the call switch.

5.2.2.5 Console interconnection

Interconnect the SPKR, GRND and AUX in pins from the appropriate intercom card outputs on the two consoles, or to talk-back Audio Connectors J36 & J37 on consoles with no intercom board.

5.2.3 Calibration

Adjust the output level control on the intercom card for more level at the remote speakers or console.

Adjust the external cue level control on the analog output board to set the intercom input level and to balance it with the cue level of the internal console cue inputs.

Maintenance and Troubleshooting

6.1 Overview

There is no required maintenance for Millenium consoles. Front panel level controls and switches will not become noisy since they control only DC for the VCAs and CMOS analog switches. A very dirty fader control will skip levels erratically. Normal cleaning agents may be used to clean the controls.

Painted surfaces should be cleaned with a warm damp cloth with mild detergent. Avoid any solvents that might attack plastic switches or meter and clock lenses.

Vacuuming or blowing dirt off of circuit boards occasionally is also recommended. Do take care to avoid dropping wire clippings on the large horizontally mounted circuit boards during console installation and maintenance.

Millenium consoles are designed for ease of repair should it become necessary. Connectors are used to make all circuit board connections. Replacement mechanical components (faders, pots) come prewired with connectors to allow quick replacement without soldering.

6.2 Power Supply

Read the Power Supply Theory of Operation prior to troubleshooting. The power supply provides all voltages for the console. Front panel LEDs monitor the DC outputs from the supplies. A second 15v LED monitors an optional power supply module which can be provided for extra current needs. The power supply modules are internally fused. The + and -7.5v outputs are regulated and derived from the + and - 15v supply.

Each regulated output has independent short circuit protection. Before suspecting the power supply of defect, unplug the power supply from the console and check the LEDs.

If the +15v and +7.5v LEDs are not illuminated the +15v supply should be checked for fault (either a defective supply or shorted +15v output) since the +7.5v has been derived from the +15v output.

If a fault is detected in one of the internal power supply modules, contact the factory for replacement. Do not attempt repair.

6.3 Six Channel Audio Board

Read the Theory of Operation prior to troubleshooting. The Six Channel Audio Board contains six identical stereo circuits. Each circuit is controlled by an individual Input Control Board. If both the left and right channels are not operating properly, or if the input cannot be placed into the cue mode, swap the Six Channel Control Board with one from a known good input before suspecting the Six Channel Audio Board of defect. This can be accomplished by interchanging ribbon cables at header J9 on the Six Channel Audio Board. If the problem is resolved, the Six Channel Control Board or associated components, such as switches, fader, or interconnecting cable is at fault.

If the problem is not resolved, signal tracing and voltage measurement techniques maybe used. If the problem is occurring in both left and right channels, the problem will most likely be with the control voltages for the CMOS analog switches or for the VCAs.

Check for signal at the insert point return, at the output of U3C and U4D, and at the output of U8A and U8B.

If there is no signal or the wrong signal (A instead of B input), at the insert point and this is occurring in both left and right channels, suspect a problem with the control voltages at Ul and U2. A bad ribbon cable connection at header J9, a defective IC at Ul and/or U2, or defective D1, D2, R25, or R32 can cause this problem. If the problem is not occurring in both channels, Ul and/or U3 (left channel), or U2 and/or U4 (right channel) should be suspect. Substitution with new ICs will produce the fastest results.

If there is no signal at the output of U3C or U4B with signal present at the insert point, then replace U3 or U4.

If signal is present at the output of U3C and U4B but is not present or is at the wrong level at the output of both U8A and U8B, the VCA control voltage should be suspect; replace U7. If desired the control voltage can be carefully measured at pin 1 of U7. With the fader at maximum the voltage will be approximately negative .07v. With the fader at minimum the voltage will be approximately +6v. If the problem is not occurring in both channels, suspect U6 and U8 (left channel), or U5 and U8 (left channel). U8 should be substituted first. If the VCA is replaced, a distortion null adjustment must be made.

If signal is present at the output of U8A and U8B but there is no signal on both the left and right of the mix buses or if the signal is routed to the wrong mix buses, the control voltages to U10 and U9 should be suspected. A bad ribbon cable

connection at header J9, a defective U9 and/or U10, or a defective R91, R93, R99, R100, R101, R102, R103, or D3, will cause this problem. If this problem is occurring in only one channel, suspect U10 (left channel) or U9 (right channel).

6.4 Six Channel Control Board

Read the Theory of Operation before troubleshooting. The Six Input Control Board utilizes a microprocessor and clue logic. Each section is identical and isolated from all others. A suspected section can be swapped with a known good one by interchanging ribbon cables.

6.5 Output Board

Read the Theory of Operation before troubleshooting. The Output Board provides several different functions for the console. It is important to understand the signal path before attempting to troubleshoot. Briefly, the audio current from the mix buses is converted back to a voltage, this voltage is fed to both the monitoring circuitry and except for the cue bus, to the output amplifiers The output amplifiers feed the output connectors and the VU meter amplifiers. The VU meter amplifiers feed the meters and the peak LED detectors. If a problem occurs in this chain, signal trace to the last stage in the chain that performs properly and then troubleshoot the following stage. Replacing the IC will usually cure the problem. As pointed out, current summing mix buses are utilized in the console. Therefore, when troubleshooting a correctly functioning mix bus, no voltage will be measurable on the bus itself.

The monitor amplifier circuitry can be broken down into several sections for troubleshooting. The first involves the CMOS analog select switches U18 and U20. If no audio, or audio that is different from the one selected, is available from the unmuted monitor outputs (left and right channel), ICs U22, U18, U20, U27 or the Monitor Control Board and its connections to the Output Board should be checked. Audio maybe monitored at pin 3 of U18 and U20. The Six Channel Audio Board section outlines the control voltages used by U18 and U20 for signal selection. These maybe measured at the IC.

If audio is missing from the left or right unmuted monitor output, suspect U22, or U18 (right channel), or U20 (left channel). If audio is available from the unmuted monitor output but not the muted output, suspect U23 and U24. If the only problem is the dimmed monitor output, in both the left and right channels suspect U23, and U33. The VCA control voltage can be carefully measured at pin 1 of U33. With the Mute 1 bus inactive, the front panel monitor level control should vary the voltage from +.6v to -.05v. With the Mute 1 bus active, the dimming trimmer should vary the voltage from +.6v to -.05v. If the problem is only occurring in one channel, suspect U24 and U26 (left channel) or U25 (right channel).

The headphone amplifier circuitry is similar to the monitor amplifier circuitry described above. The major difference is that U27 either selects the CMOS analog switch control voltages from either the headphone switches (normal mode) or the monitor switches (follow mode).

The cue amplifier circuitry can be monitored in three places. If signal is not present at pin 1 of U12, replace U12 or check the associated components. If signal is present at pin 1 of U12, check for signal at C114. If signal is not present suspect Q6 or associated components. If signal is present at C114, suspect U28, U29 or the front panel cue level control or a connection from the Headphone Control Board. The VCA control voltage at pin 2 of U29 can be carefully measured. The voltage will vary from +.6v to -.05v depending on the setting of the level control.

6.6 Changing VCAs

6.6.1 Distortion Null Adjustment

VCA distortion null is typically not required unless a VCA or distortion trimmer has been replaced. To null distortion on an input board:

1. Connect a +4dBv, 2kHz sine signal to the defective input. Remove any gain jumpers or attenuators.
2. Turn the mixing channel on and set the fader for “0.” Select the program bus output.
3. Connect a distortion analyzer to the defective program output (right or left) and adjust the associated VCA distortion null for a minimum distortion reading on the analyzer.

If a monitor, headphone, or cue VCA needs replacing:

1. Connect a 4dBv, 2kHz sined signal to any line level input associated with the defect (right or left). Remove any gain jumpers or attenuators.

2a. For defective monitor or headphone VCA’s, select the program bus and turn the channel on. Set the fader to “0.”

2b. Set the monitor or headphone level control to 1/2 full.

2c. Connect a distortion analyzer to the defective output and adjust the associated VCA distortion null for a minimum distortion reading on the analyzer.

3a. For a defective cue VCA, set the fader to “cue.”

3b. Set the cue headphone level control to 1/2 full.

3c. Connect a distortion analyzer to the cue speaker and adjust the associated VCA distortion null for a minimum distortion reading on the analyzer.

Theory of Operation

7.1 Power Supply Circuit Description

The external power supply provided with Millenium Consoles contain internal modules which provide +15v and -15v at 6 Amps. Each supply is internally fused. Output voltages from the modules are connected to the Power Supply Interface Board at J1 and J4.

The internal modules are further regulated to provide +7.5 and -7.5 volts required by the console.

Front panel LED monitoring is provided for all regulated outputs.

The Power Supply Interface Board contains:

1. A common ground point for all power supply and console circuits.
2. Connections from the modules to power header J3 which provides main power to the console, and to header J2 which provides power for the Cue Amplifier.
3. Status indicator LEDs for all power supply outputs.
4. VR1 and VR2 which provide negative and positive 7.5 volts respectively.

7.1.1 Grounding

The following grounds are tied together at the power supply: A.C. power, power supply chassis, Module A common, Module B common, console digital ground, console analog ground, console headphone ground, console cue amplifier ground, and console chassis ground.

7.1.2 Positive and Negative 7.5 volts

VR2 and VR1 are three terminal adjustable voltage regulators which have been set at the factory to provide +7.5 volts and -7.5 volts respectively from the output of Module B. These voltages are used to provide power to the front panel level controls (which in turn control the VCAs) as well as to the CMOS audio switches.

7.2 Six Channel Control Board

7.2.1 Brief Description

The Six Input Control Board provides six identical and independent logic circuits. One circuit is associated with each mixing channel lid..

Each circuit provides the following:

1. Input select logic and indicators, cue logic and indicators, and on/off logic and indicators.
2. Interface between logic levels and those required by the Six Channel Input Board
3. Interface between the fader and VCAs (located on the Six Channel Input Board)
4. Generation of Mute 1 and Mute 2 control voltages
5. Generation of Timer Reset pulse
6. User remote control and remote interface connections

7.2.2 Detailed Description

As each circuit is identical, only one will be described. There are no connections between circuits. Microcontroller U2 has five ports (RA, RB, RC, RD, and RE). Ports RB and RE are configured as outputs, the others as inputs. The output port signals are as follows:

RBO	High with Input A selected, low with Input B selected
RB1	High to bring the VCA's to full attenuation
RB2	High when the Program Bus is selected

RB3 High when the Audition Bus is selected

RB4 High when the Telephone Bus is selected

RB5 High when the Cue Bus is selected

RB6 High when the channel is on

RB7 High when the channel is off

RE0 High (momentary or maintained) to provide a remote control pulse or holding signal when the channel is turned on.

RE1 High (momentary or maintained) to provide a remote control pulse or holding signal when the channel is turned off

RE2 High (momentary) when the on button is pressed to generate a timer reset signal

U2 sets the state of its output ports depending on the signals (switch and jumper set) present at its input ports (RA, RC and RD).

U3A, B and C "logic" and the selected buses with the channel on signal. U4, B and C provides an interface between the logic level signals and those required by the Six Channel Input Board. U5 switches either its A or B inputs to its Y outputs depending on the state of the signal at U5 pin 1. U5 routes the proper Mute, Timer Reset and Ready Lamp signals to their destination depending on the input selected (A or B). In similar fashion, based on the input selected, U1 selects the proper pulse or holding signal to route to the user remote control.

See the "Six Channel Control Board" section for jumper selection and operational details.

7.3 Six Channel Audio Board Circuit Description

7.3.1 Brief Description

The Six Channel Input Board contains six identical stereo amplifiers which provide the following:

1. selection of the input signal
2. gain adjustment of the input signal
3. routing of the selected signal to the desired mix bus or buses

7.3.2 Detailed Description

The left and right channels are identical, so only the left will be discussed.

Left channel input A signals are attenuated 13dB by R1, R3, and R2 (or by R8, R7 and R9 for input B) before routing to IC U1, a type 4052 analog switch. The amount of attenuation maybe varied by the installation of resistors into the DIP component carriers provided, and then plugging the DIP component carriers into socket J3 for input A or J4 for input B. Bridging R3 (or R9) would increase the attenuation while bridging R1 and R2 (or R8 and R7) would decrease the attenuation. Adjusting the attenuation allows each input to accept signals ranging from microphone to high level.

Integrated circuit U1 selects either input A or input B depending on the voltage present on pin U1-10. A low on pin 10 will allow input A signals to reach the following circuitry. Input B will be selected if pin 10 is high. The voltage on pin10 is controlled by circuitry on the Input Control Board.

Integrated circuit U3 (sections A, B, and C) and transistors Q1 and Q2 form a differentially balanced instrumentation amplifier for left channel input signals. Transistors Q1 and Q2 are low noise devices which allow this circuit to operate with microphone levels in addition to high level inputs. Transistors Q1, Q2, and integrated circuits U3A and U3D form a balanced amplifier whose gain is determined by R28, R29 and R21. The gain may be increased by the installation of jumpers onto header J5 which would reduce the value of R21. A -7.5v reference is fed to the positive inputs of U3A and U3D which in turn control the current through Q1 and Q2 so that the negative inputs of U3A and U3D also remain at -7.5v. This feedback makes Q1 (Q2) a part of U3A (U3D) rather than an independent amplifier preceding the IC. Integrated circuit U3B is a differential amplifier which converts the balanced signal from U3A and U3D to a unbalanced signal.

The signal from U3B is summed with right channel signal from U4C and routed to Q7 which will place this mono signal onto the Cue Bus when the Q7 is tured on (by pulling its gate low) by the Input Control Board. In addition, the signal also is routed to J7, a stereo unbalanced insert point, as well as header J7, which allows bypassing of the patch point, and easy placement of a mixing channel into mono operation. In this case, the left input would feed both the left and the right channel mix buses. The level at this point is nominally -4dBm. Integrated circuit U3C buffers the signal from the insert point prior to IC U6, a dBx Voltage Controlled Amplifier (VCA).

The VCA is a current in, current out device, which may provide amplification as well as attenuation of the signal from U3C. The VCA is capable of over 100 dB of level control, depending upon the control voltage applied to pin 3 of the VCA. The front panel linear taper fader supplies a control voltage ranging from +7.5v at the minimum setting of the fader to 0 volts at the maximum setting. This voltage is applied to the positive input of U7B which serves as a buffers. Resistors R75 and R76 attenuate the buffered control voltage to levels acceptable by the VCA. Transistors Q5 and Q6 in conjunction with resistors R78 and R79 shunt R76 to convert the linear fader taper into a three slope audio taper approximation. The turn on points for Q5 and Q6 are determined by the fader setting and the voltage reference on the bases of Q5 and Q6. U7A and resistors R74 and R77 add a negative offset to the control voltage so that the VCA is at unity gain at normal fader settings, and is supplying 15dB of gain at the maximum fader setting. In addition, U7A drives both left and right channel VCAs to maintain proper channel tracking. VR2 is the VCA distortion null adjustment. Integrated circuit U8A converts the current output from the VCA into a voltage.

Integrated circuit U10 is a 4053 analog switch which connects the output of U8A to the mix buses as determined by voltages from the Input Control Board which are applied to U10 pins 6, 9, 10, and 11. Pin 6 must be low in order for the signal from U8A to reach any mix bus. Pulling pin 9 high (+7.5v), in conjunction with pulling pin 6 low, will place the signal from U8A onto the mono mix bus. Similarly, pulling pin 10 or pin 11 high will place the signal onto the audition and program mix bus respectively. Since pins 9, 10, and 11 operate independently from each other, any combination of mix buses may be selected at the same time.

7.4 Monitor Control Board

7.4.1 Brief Description

The Monitor Control Board is mounted on the right-hand side of the console lid and provides the following functions:

1. Monitor select logic and indicators, headphone select logic and indicators.
2. Interface between logic levels and those required by the Output Board.
3. Interface between the Monitor, Headphone and Cue level controls and the VCA's located on the Six Channel Input Board.
4. Clock Timer interface and Timer Auto Reset and Start logic.
5. Eight position accessory switches and associated LED's

7.4.2 Detailed Description

Microcontroller U3 has five ports (RA, RB, RC, RD, and RE). Ports RA, RB and RE are configured as outputs, the others as inputs. The output port signals are as follows:

RA0	Low when the Program Bus is selected for headphones
RA1	Low when the audition Bus is selected for headphones
RA2	Low when the Telephone Bus is selected for headphones
RA3	Low when the Cue Bus is selected for headphones
RA4	Low when the Timer Auto Reset and Start functions are enabled
RA5	Low when External Input 1 is selected for headphones
RE0	Low when External Input 2 is selected for headphones
RE1	Low when External Input 3 is selected for headphones
RE2	Low when External Input 4 is selected for headphones
RBO	Low when the Program Bus is selected for the monitor
RB1	Low when the Audition Bus is selected for the monitor
RB2	Low when the Telephone Bus is selected for the monitor
RB3	Low when the Cue Bus is selected for the monitor
RB4	Low when External Input 1 is selected for the Monitor
RB5	Low when External Input 2 is selected for the Monitor
RB6	Low when External Input 3 is selected for the Monitor
RB7	Low when External Input 4 is selected for the Monitor

U3 sets the state of its output ports depending on the signals (switches) present at its input ports (RC and RD). U2 and U4 converts the output of U2 to the BCD format required by the analog switches on the Output Board. Transistors Q1, 2, 3, 4, 6 and 7 provide an interface between the logic level signals and those required by the Output Board. Transistors Q5 and Q8 interface the Timer Auto Reset and Start signal with the Clock/Timer. Transistor Q9 turns on (under control of U3) to prevent the Auto Reset and Start signal from reaching the Clock/Timer. Eight accessory switches and LED's are brought out at J1 and J2 for user remote interface. Current limiting resistors for the LED's are user-installed into header J5.

The voltage from the wiper of the Monitor, Headphone and Cue level controls is filtered and scaled to proper VCA levels by the associated capacitor and resistors.

7.5 Output Board Circuit Description

7.5.1 Brief Description

The Output Board performs the following functions;

1. Summing mix bus current to voltage conversion
2. Differentially balanced audio output amplifier
3. Differential meter amplifiers
4. Peak detectors and LED drivers
5. Input selection of headphone and monitor amplifier signals
6. Level control and muting of monitor amplifier signals
7. Level control and power amplification of headphone signals
8. Level control and power amplification of cue signal
9. Talk back control and interface
10. Drivers for Mute 1, Mute 2, and timer reset
11. Power supply distribution to the Six Channel Mixer Boards

7.5.2 Detailed Description

Five of the six summing buses in the console are similar to each other. These are left program, right program, left audition, right audition, and mono. The sixth mixing bus for the cue channel will be discussed separately. Integrated circuit U14B is utilized as a unity gain current to voltage converter for the left program mixing bus. The output of U14B is routed to the headphone and monitor select CMOS analog switches as well as to VR7 for adjustment prior to receiving 20dB of amplification from U7A. U7A drives the + left program channel output while U7B inverts the output of U7A and drives the -left program channel output. Integrated circuit U2A, diodes Dl thru D4 and the associated resistors convert the balanced left program channel output to a floating D.C. voltage to drive the left program VU meter. Therefore, the effects of loading the console output or erroneously grounding one of the console outputs will be reflected on the VU meter. Trimmer VR2 provides "0" VU adjustment for a range of console outputs. Differential amplifier U2B converts the meter voltage from floating to single ended prior to applying the voltage to U15A. Integrated circuit U15A functions as a peak detector with the trip point adjusted by VR12. When the positive peak of the audio signal (applied to U15 pin 4) becomes more positive than the reference set by VR12 the output of U15A will go to -15 volts and in turn the output of U15B will go to -15 volts and illuminate the peak LED. At the conclusion of the peak U15 pin 4 will fall to lower potential than the reference set by VR12, and the output of U15A (which is an open collector) will allow C59 to be charged by R115. When the potential at U15 pin 9 is more positive than the reference at U15 pin 8 the output of U15 B will go high and the LED will extinguish. Capacitor C59 and resistor R115 act as a .5 second peak stretcher which allows the LED to properly illuminate.

Integrated circuit U12A converts the cue mix bus signal to a voltage and then the signal is routed to the headphone and monitor select CMOS analog switches, and to the cue VCA. Integrated circuit UIA allows an external signal (such as talk back) to be summed onto the cue summing bus. VRl allows adjustment of the external signal.

The monitor amplifier circuitry is identical for the left and right channels. So only the left channel will be discussed. Integrated circuit U20 is a 4051 CMOS analog switch. U20 is a single pole, eight position switch. Eight inputs are connected to U20 which selects one input depending on the voltages present on U20 pins 6, 9, 10, and 11, and routes the selected input to U20 pin 3. Four of the inputs to U20 come from the output of the mix bus current to voltage converters. These are left program, Left Audition, Mono, and Cue. In addition, there are four external inputs (A thru D) which are

connected to the input of U20. Each external input has an associated trimmer for level adjustment. The voltage at U20 pins 6, 9, 10, 11 are generated on the Monitor Control Board. The truth table for input selection is as follows:

Input	Pin 6	Pin 9	Pin 10	Pin 11
None	High	Low	Low	Low
Program	Low	Low	Low	Low
Audition	Low	Low	Low	High
Mono	Low	Low	High	Low
Cue	Low	Low	High	High
A	Low	High	Low	Low
B	Low	High	Low	High
C	Low	High	High	Low
D	Low	High	High	High

Integrated circuit U22B provides 32dB of gain to the selected signal. U22B drives the Unmuted Left Channel Monitor Output, the input of VCA U26, and one of the inputs of U23, a 4053 type CMOS analog switch. VCA U26 is a dBx current in, current out device, capable of over 100dB of level control. U24B is a current to voltage converter which drives the Left Channel Monitor Output. Trimmer VR26 provides distortion null adjustment for the VCA. There are two voltages available to control the gain of the VCA. The first is generated by the front panel monitor level control, and the second is generated by trimmer VR27 which is the monitor dim control. Whenever the Mute 1 Control Bus is high, U23 pin 9 will also be high, and the wiper of VR27 will be connected to the positive input of U33A. Similarly, when the Mute 1 Control Bus is low, U23 pin 9 will also be low and the wiper of the front panel monitor level control will be connected to the positive input of U33A. U33A buffers the selected control voltage and provides a negative offset so that the VCA will operate at unity gain at normal level control settings, and will provide 15dB of gain at when the level controls are set at maximum. When Mute 2 Control Bus is high, U23 pins 10 and 11 are also high and the selected monitor signal is disconnected from the input of U24D which drives the Left Channel Muted Monitor Output.

The operation of the headphone amplifier is similar to the monitor amplifier. The inputs of U21 (the headphone input select CMOS analog switch) are paralleled with U20. Selection of the input signal is identical to that of the monitor amplifier circuit with the exception of U27. The control voltages from the Monitor Control Board appear at U27 pins 1, 3, 5, and 7, while the control voltages from the Headphone Control Board appear at U27 pins 2, 4, 6, and 15. If no headphone input switches are depressed, U19 will connect the control voltages from the Monitor Control Board to U21, resulting in a headphone follows monitor configuration. Otherwise, the Headphone Control Board will select the desired headphone input. Integrated circuit U22D drives a prefader headphone output, U31 is a dBx VCA, U30 is a power amplifier for driving headphones, and U33 buffers and offsets the VCA control voltage generated by the front panel headphone level control.

The output of the Cue Bus current to voltage converter is connected to transistor Q6, which inhibits the cue audio from reaching VCA U28, if the Mute 1 Control Bus is high. U29B is a power amplifier for driving the cue speaker, and U29A buffers and offsets the VCA control voltage generated by the front panel cue level control.

Talk back signals are gated by transistor QI (which is controlled by the front panel talk back switch) prior to buffering and amplification by UIB.

Transistors Q5, Q4, and Q3 provide open collector outputs for the Mute 1, Mute 2, and Timer Reset control buses respectively.

7.6 RFI Suppression

Careful consideration has been given to Radio frequency Interference protection in the RS Series consoles. Internal designs employed include RF bypass capacitors, ground plane circuit board technology, metal rap-around enclosures and single point ground returns.

Still, because every RF environment is unique, some extremely intense RF locations, especially high AM fields, may still experience some interference. These installations will require individual, on-site troubleshooting to eliminate the interference.

1. Locate the source of the interference. RF may enter the console via input or output lines.

   Turn off the channels via the channel on/off switch. If the RFI disappears, the source of the interference is that channels input wiring.

   If the RFI does not disappear, unplug the output connectors, one at a time, on the Output Board. When the interference disappears, you have located the source of the AFI.

2. Change the grounding system.

   The console routes all signal and control grounds to a single ground point at the powersupply. This is usually the preferred method to minimize noise and RFI.

   However, on the input(s) or output(s) you have determined to be causing RF interference, you should reroute the ground.

   If the interference persists, reroute the input or output ground wire to the console chassis ground. This is conveniently available at the nearest circuit board mounting screw.

7.7 Using Active Balanced Circuitry

Balanced lines have been used for many years and are in continuing use today because of their immunity to stray pickup. Induced signals appear on both sides of the balanced line. The receiving end of the balanced line responds only to the difference voltage between the lines which is the desired signal. Induced signals are common to both and are balanced out.

Transformers have been the mainstay of balanced circuitry for decades. Unfortunately, transformers cause distortion and ringing, and are susceptible to magnetic flux pickup. Further, good quality audio transformers are very expensive.

The use of op-amp balanced circuitry has the advantage of transformers without the disadvantages. The only caveat is that careful wiring practices are more important with active balanced than with transformers.

Active balanced outputs and inputs use three wires: +, -, and ground. The + and - terminals are both driven and neither should ever be connected to ground. For best performance, a three-conductor shielded wire should be used. The third wire completes the ground circuit. The shield should be connected to the ground at one end of the wire only.

If a two-wire shielded cable is used, it is important that a ground connection be made between the sending and receiving units. A ground circuit through equipment chassis or through three-prong AC cord ground is also acceptable.

Single-ended audio interconnections lack the interference immunity of balanced hook-ups. For the reason, keep unbalanced connections short, direct, and well separated from AC power wires. To drive a single-ended load from an active balanced source, use coaxial wire: + to center conductor and ground to shield, leaving the - output unconnected. To feed an active balanced input from a single-ended source, use coaxial wire, connecting the hot center conductor to +. Connect the shield to ground and put a jumper from ground to -.

When driving an active balanced input from a transformer balanced floating source, use two conductor shielded wire. Ground the shield at the source end. Establish good ground between the chassis either directly or though AC plug ground prongs. At the load, connect the + lead to the + input and the - lead to the - input. Put two 300 ohm resistors in series between the + input and the - input and connect their mid-point to the load ground. This correctly terminates the source output transformer for optimum frequency and transient response (freedom from ringing) and provides a low impedance return path for leakage and induced hum. If more than one active balanced load is to be placed across a floating balanced transformer source, install this resistive termination once only. From that location to the active balanced loads, run three-conductor shielded wire, shield continued from the sources chassis, + from +, - from -, and ground from the mid-point of the terminating resistors.

To drive a balanced floating transformer load from an active balanced source, use shielded wire. Connect the shield to source ground and leave the shield open at the load end. Connect + to + and - to -, and establish a good source ground to load chassis connection, either through a third wire in the interconnect cable or through chassis contact or AC cord third wire ground.

Interconnections between pieces of stereo equipment require doubling the connections described above without duplicating the ground connection. Between pieces of active balanced stereo equipment, then, 5 shielded conductors should be run.

When testing active balanced equipment with single ended test equipment, do not connect the - to test equipment ground. Most modern test equipment provides balanced inputs. In many dual-trace oscilloscopes, balanced signals may be displayed by running the two inputs in the “add” mode with one input switched to invert. To perform a test with single-ended equipment, + and - outputs must be tested independently and their results added. Testing only a single output results in a 6 db loss in output level.

The active balanced equipment interconnection format makes possible state of the art fidelity. Careful attention to detail and conservative practice will be rewarded with outstanding flat frequency response, low distortion, and wide dynamic range.

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

IFB FUNCTIONS

NON IFB FUNCTIONS

Remote On — Remote A On J4-12

Remote Off — Remote A Off J4-5

Restore — Remote B On J4-1

CUE — Remote B Off J4-2

Fader Cue Switch J3-1

Fader Cue Switch J3-2

Fader Start/Stop "A" JU1-A

Remote A Pulse/Hold Okay "D" JU2-A

Remote B Pulse/Hold Okay "B" JU1-B

No Cue in A "M" JU4-B

No Cue In B "L" JU4-A

Cue on Detent "K" JU3-C

Cue Follow On/Off "J" JU3-B

A Hold/Pulse "H" JU3-A

B Hold/Pulse "C" JU1-C

S1 A, S2 B, S3 PGM, S4 AUD, S5 TEL, S6 CUE, S7 OFF, S8 ON

U2 PIC16F914

ICSP HEADER JUMPER PINS 2 AND 4 FOR NORMAL OPERATION

HEADER_2X3A

IFB JUMPER NOTES
REMOVE JUMPER FOR IFB REMOTE CONTROL FUNCTIONS
INSTALL JUMPER FOR NON IFB REMOTE CONTROL FUNCTIONS
CONSOLE POWER MUST BE CYCLED AFTER CHANGING THIS JUMPER

"E" JU2-B SEE IFB JUMPER NOTES

J25-1 ON SWITCH OUTPUT

J25-14 UTILITY BUS CONTROL

UTILITY BUS "1" "2" CUE — JU9 CUE LED

Remote Pulse/Hold Outputs

A Input + On — Q6 ZXMN6A07F — U1-A 74HC08

A Input + Off — Q4 ZXMN6A07F — U1-B 74HC08

B Input + On — Q5 ZXMN6A07F — U1-C 74HC08

B Input + Off — Q2 ZXMN6A07F — U1-D 74HC08

Q7 ZXMN6A07F

A Remote Ready Lamp J4-6 — D6 4148 — "1" "2" JU7

JU7 shown for remote. Move jumper for local.

B Remote Ready Lamp J4-13 — D5 4148 — "1" "2" JU8

JU8 shown for remote. Move jumper for local.

Pressing On Turns Cue Off "F" JU2-C — Q10 ZXMN6A07F

A Timer Reset "S" JU5-C

B Timer Reset "U" JU6-B

A Mute 1 "T" JU6-A

B Mute 1 "Y" JU6-C

A Mute 2 "P" JU5-A

B Mute 2 "R" JU5-B

U4 74HC157

Q14 ZXMN6A07F — J2-2 Input Select

Q20 ZXMN6A07F — J4-14 Remote On Tally

Q1 ZXMN6A07F

Q16 ZXMN6A07F — J2-1 Cue Select

Q19 MUN5314 — J2-4 PGM Select

Q17 MUN5314 — J2-6 AUD Select

Q18 MUN5314 — J2-5 TEL Select

Q15 MUN5314

REMOVE FOR MILLENIUM-D "N" JU4-C

CUE EXCLUSIVE

JU10 "1" "2" — J2-3 MIX BUSS SELECT

JU206 SHOWN FOR MILLENIUM-A MOVE FOR MILLENIUM-D

Q11 MUN5314 — J2-11 Mute 1 Select

Q12 MUN5314 — J2-7 Mute 2 Select

J2-12 Timer Reset

Q13 ZXMN6A07F — Channel On

Q21 ZXMN6A07F — Channel Off

Q3 ZXMN6A07F — J4-9 Remote Off Tally

Q8 MUN5314

D10 4148

D18 SMAZ7V5

D19 4148

J3-5 Top of Fader
J2-16 Analog Gnd
J3-4 Fader Wiper
J2-10 +7.5V
J3-3 Bottom of Fader
J2-15 Fader D.C.

J4-8 Remote Cough

+15VD, +5V, +15V

MRA4005 D17

LM340S-5.0 U5

+15V J2-13
+15V J2-14
Remote +15V J4-15
Remote Gnd J4-10
GND J2-8
GND J2-9

C8 100UF, C9 100UF, C2 .1UF, C3 .1UF, C6 .1UF, C7 .1UF, C1 .1UF

D20 MMSZ5234

WITH THE EXCEPTION OF J25 ALL CIRCUITRY REPEATS 6 TIMES

J25-2	CH2 ON SWITCH OUTPUT
J25-13	CH2 UTILITY BUS CONTROL
J25-3	CH3 ON SWITCH OUTPUT
J25-12	CH3 UTILITY BUS CONTROL
J25-4	CH4 ON SWITCH OUTPUT
J25-11	CH4 UTILITY BUS CONTROL
J25-5	CH5 ON SWITCH OUTPUT
J25-10	CH5 UTILITY BUS CONTROL
J25-6	CH6 ON SWITCH OUTPUT
J25-9	CH6 UTILITY BUS CONTROL

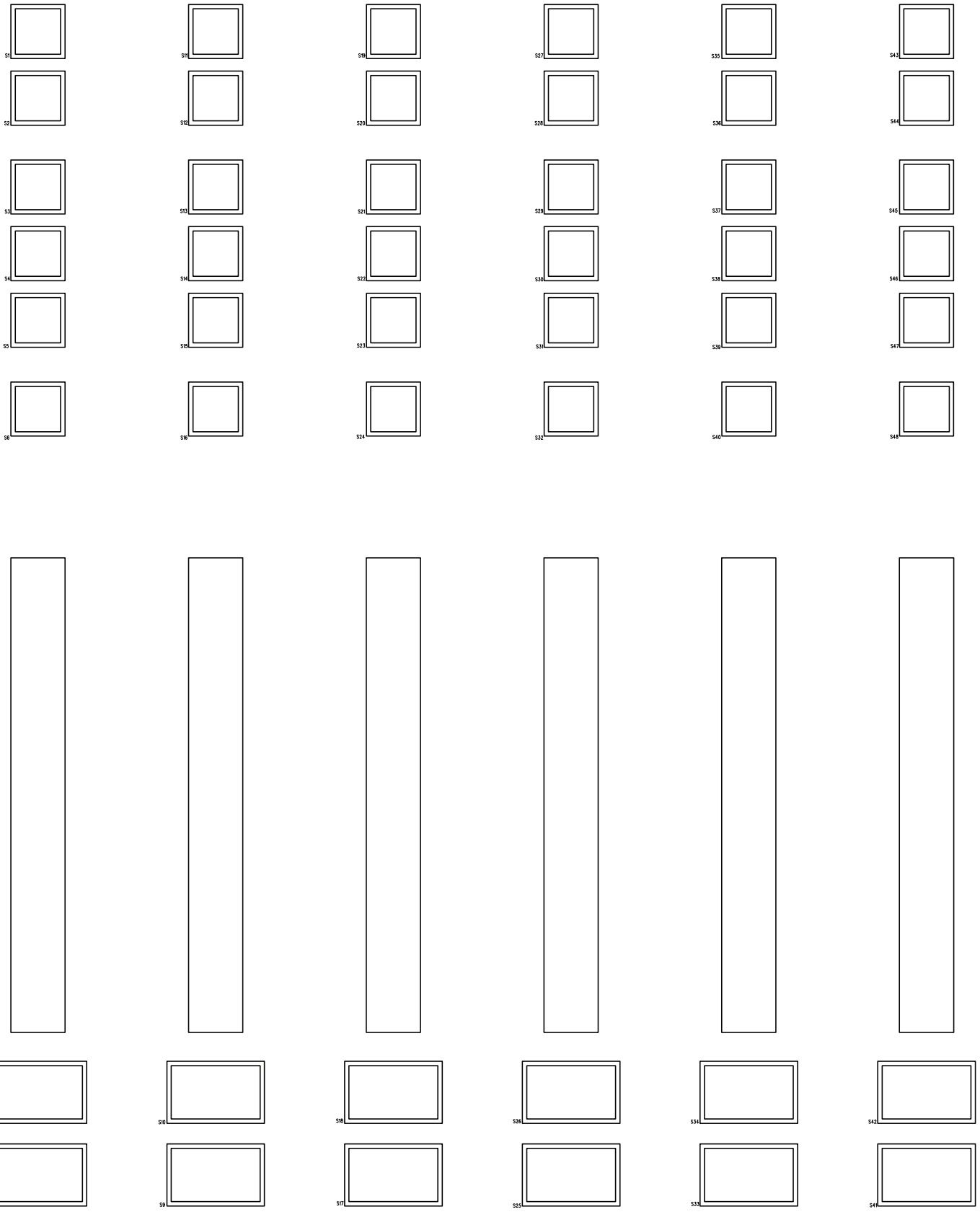
DRAWN: SIRKIS	DATED: 6-2-2011
CHECKED:	DATED:
QUALITY CONTROL:	DATED:
RELEASED:	DATED:

COMPANY: RADIO SYSTEMS

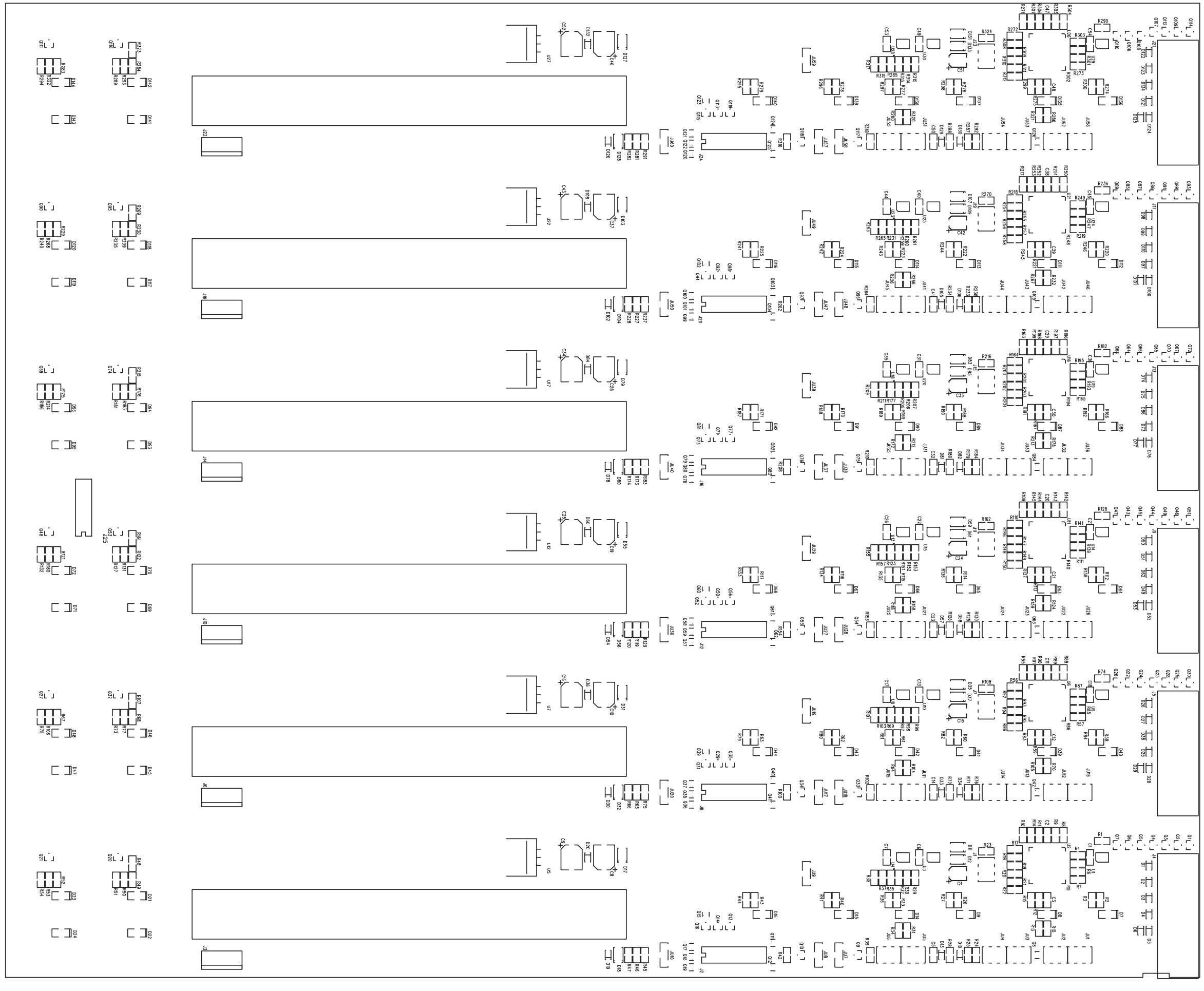
TITLE: MILLENIUM SMT CONTROL BOARD

CODE:	SIZE:	DRAWING NO:	REV:
	D	BLANK BOARD 18515 ASSEMBLY ANALOG 18516 ASSEMBLY DIGITAL 18522	

SCALE: NONE — SHEET: 1 OF 1



radio SYSTEMS Logan Township, NJ	TITLE: SIX CHANNEL CONTROL BOARD
MILLENIUM RS-A CONSOLE	TYPE: PARTS LAYOUT-TOP SIDE
	DATE: 7-29-2008 PART NO: 18516 REV: E



TITLE:	INPUT CONTROL BOARD
TYPE:	PARTS LAYOUT - BOTTOM SIDE
DATE:	9-2011
PART NO:	18516
REV:	E

RGH SYSTEMS
Logan Township, NJ

MILLENIUM
RS-A CONSOLE

SIX CHANNEL CONTROL BOARD PARTS LIST

RS Part #	Manufacturer Part #	Reference Description	Value	Manufacturer	Descrip.	Qty
18517	CD74HC08PW	U1,3,9,10,14,15, 19,20,24,25,29,30	74HC08	TI	QUAD 2-INPUT POS-AND GATE	12
18518	SN74HC157PW	U4,8,13,18,23,28	74HC157	TI	QUAD 2-TO-1-LINE DATA SELECTOR/MULTIPLEXER	6
16005	ECJ-2YB1H104 K	C1-3 C5-7,C11-14,17, 18,C20-23,C26-27,29, C30-32,35,36,38,39, 40,41,44,45,47,48,49, 50,53,54	.1UF	PANASONIC	SURFACE MOUNT CAPACITOR 0.048 X 0.079 INCHES	36
15505	ICF-314-T-O	J25		SAMTEC	14 PIN SMT DIP SOCKET	1
16655	ICF-316-T-O	J2,8,12,16,20,24		SAMTEC	16 PIN SMT DIP SOCKET	6
16006	EEV-FK1V100U R	C4,15,24,33,42,51	10UF	PANASONIC	CAP SURFACE MOUNT POLAR VS-B	6
16643	EEE-FK1E101X P	C8-9 ,10,16,19,25,28, 34,37,43,46,52	100UF	PANASONIC	CAP SURFACE MOUNT POLAR VS-D	12
10928	DNP-15STCC-G-F1	J4,5,9,13,17,21		KELTRON	15 PIN D CONNECTOR	6
16512	MMSD4148T1G	D1-6 D10 D13 D19,D25-30, D33,34,38,49, D50-54,57,58,62, D73-78,81,82,86,97, D98-102,105, 106,110,D121-126,129,130,134		ON SEMICONDUCTOR	SWITCHING DIODE	54
16717	MMSZ5234BT1	D20,36,60,84,108,132	6.2V 1W	ON SEMICONDUCTOR	ZENER DIODE 6.2V 1W	6
16719	MRA4005-T1	D11,17,31,35,55,59,79, 83,103,107,127,131	MRA4005	ON SEMICONDUCTOR	DIODE	12
18519	SMAZ7V5	D18,32,56,80,104,128	SMAZ7V5	MCC	ZENER DIODE 1W	66
16626	B340LA-13	D12,37,61,85,109,133	B340LA-13	Diodes Inc	Schotty Rectifier B340LA	6
7052	AMP-640456-5	J3,6,10,14,18,22		Amp	5 PIN MTD HEADER	6
18571	TSM-106-01-T-DV-P-TR	JU1/2,3/4,5/6,16/12, 13/14,11/15,26/22, 23/24,21/25, 36/32,33/34,31/35,46/42, 43/44,41/45,56/52,53/54,51/55		SAMTEC	HEADER 6 PIN (2 X 3)	18
16904	TSM-103-01-T-DV-P-TR	JU1,7,11,15,19,23		SAMTEC	HEADER 6 PIN (2 ROWS x 3) SMD	6
18523	23-21B/R7C-AM1N2LZ/2A	D7-9 D14-16 D23-24,33,39, D40-43,D47-48 D63-67,71,72, D87-91,95,96,D111-115,119,120 D135-139,143,144		EVERLIGHT	LED SMT REVERSE MOUNT RED	42
18524	23-21B/Y2C-AN1P2/2A	D16,21,22,D44-46,D68-70,D92-94, D116-118,D140-142		EVERLIGHT	LED SMT REVERSE MOUNT AMBER	18
16011	LM2940S-5.0	U5,7,12,17,22,27	+5V	NATIONAL SEMI	POS VOLT REG	6
18520	MUN5314DW1	Q8,11,12,15,Q17-19,Q36-42, Q57-63 Q78-84,Q99-105,Q120-126	MUN5314	ON SEMI	COMPLEMENTARY NPN PNP PAIR	42
18521	PIC16F1914 I/PT	U2,6,11,16,21,26	PIC16F1914	MICROCHIP	FLASH MICROCONTROLLER 32MHZ	6

SIX CHANNEL CONTROL BOARD PARTS LIST

RS Part #	Manufacturer Part #	Reference Description	Value	Manufacturer	Descrip.	Qty
16575	RC0805FR-071OKL	R1,R3-9,14,15,17,23,27-32,34-39, 41,42,44,51,54,74,79-104,108,557, 56,64,69,72,73,78,128,133-158,162, 110,111,118,123,126,127,132,172, 177,180,182,187-212,164-165,181, 186,236,241-266,218,219,226,231, 234-235, 240,270,290,295-320,273, 280,285,288,324,289,294	10K	YAGEO	SURFACE MOUNT RESISTOR 0.048	210
16019	RC0805FR-071 KL	R45-47,65,66,75,119,120,129,173, 174,183,227,228,237,281,282,291	10K	YAGEO	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	18
17022	ERJ-6ENF2211	R48,107,161,215,269,323	2.21K	PANASONIC	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	6
16023	RC0805FR-073 57RL	R2,58,112,166,220,274,12,59,113, 167,221, 275,26,60,114,168,222, 276,33,61,115,169,223,277,40,62, 116,170,224,278,43,63	357	YAGEO	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	36
14667	RC0805FR-074 K7L	R13,105,159,213,267,321,24,25, 71,76,125,130,179,184,233, 238,287,292	4.7K	YAGEO	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	18
16041	RC0805FR-074 22RL	R49,50,68,77,122,131,176,185, 230,239,284,293,52,53,67,106, 121,160,175,214,229,268,283,322	422	YAGEO	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	24
16916	RC0805FR-074 7K5L	R10,70,124,178,232,286	47.5K	YAGEO	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	6
14468	ERJ-6GEYR00	R16,55,109,163,217,271	DNP	PANASONIC	SURFACE MOUNT RESISTOR 0.048 X 0.079 INCHES	6
16025	ZXMN6A07FTA	Q1-7,14,16,9,10,13,20-35,43-56, 64-77,85-98,106-119	8MM	Zetex	N TYPE MOSFET	84

REVISION RECORD			
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Monitor Switches
PGM S4 — RC0
AUD S14 — RC1
TEL S15 — RC2
CUE S16 — RC3
EXT1 S24 — RC4
EXT2 S25 — RC5
EXT3 S26 — RC6
EXT4 S30 — RC7

Headphone Switches
PGM S3 — RD0
AUD S11 — RD1
TEL S12 — RD2
CUE S13 — RD3
EXT1 S21 — RD4
EXT2 S22 — RD5
EXT3 S23 — RD6
EXT4 S29 — RD7

Timer Auto S20 — D33 1N4148 — RC3
D34 1N4148 — RC7
D31 1N4148 — RD2
D32 1N4148 — RD5

RC[0:7] — R2-C 10K — RC0; R2-F 10K — RC1; R2-E 10K — RC2; R2-D 10K — RC3; R3-B 10K — RC4; R3-C 10K — RC5; R3-D 10K — RC6; R3-E 10K — RC7

RD[0:7] — R2-C 10K — RD0; R2-A 10K — RD1; R2-B 10K — RD2; R2-A 10K — RD3; R3-F 10K — RD4; R3-G 10K — RD5; R3-H 10K — RD6; R3-I 10K — RD7

+5V — R2-I 10K — D28 1N4148 — C5 10UF; R4 3.32K — C4 100PF

U3 PIC16C64A
MCLR, OSC1, OSC2
RC0–RC7, RD0–RD7
RA0–RA5, RE0–RE2

RB[0:7] — U4 74HC147 — Y0–Y3, AB
R1-H 10K — J4-7 Monitor Control A — Q1 2N7000
R1-F 10K — J4-5 Monitor Control B — Q3 2N7000
R1-C 10K — J4-15 Monitor Control C — Q7 2N7000

RE[0:2] — Monitor Leds
D3 PGM — R7 220 — +5V
D10 AUD
D11 TEL
D12 CUE
D20 EXT1
D21 EXT2
D22 EXT3
D25 EXT4

U2 74HC147 — Y0–Y3, AB
R1-G 10K — J4-8 Headphone Control A — Q2 2N7000
R1-E 10K — J4-4 Headphone Control B — Q4 2N7000
R1-D 10K — J4-2 Headphone Control C — Q6 2N7000

Headphone Leds
D2 PGM — R6 220 — +5V
D7 AUD
D8 TEL
D9 CUE
D17 EXT1
D18 EXT2
D19 EXT3
D24 EXT4

RA[0:5]
RA4 — R5 220 — D16 Auto Led — +5V

S1 — J1-5 Switch Common; J1-13 Switch 1; D1 — J5-12, J5-5 — J1-4 Led1 C; J1-12 Led1 A
S5 — J1-6 Switch 2; D4 — J5-11, J5-6 — J1-3 Led2 C; J1-11 Led2 A
S6 — J1-14 Switch 3; D5 — J5-10, J5-7 — J1-2 Led3 C; J1-10 Led3 A
S7 — J1-7 Switch 4; D6 — J5-9, J5-8 — J1-1 Led4 C; J1-9 Led4 A; J1-8 +15V; J1-15 GND
S17 — J2-5 Switch Common; J2-13 Switch 5; D13 — J5-13, J5-4 — J2-4 Led5 C; J2-12 Led5 A
S18 — J2-6 Switch 6; D14 — J5-14, J5-3 — J2-3 Led6 C; J2-11 Led6 A
S19 — J2-14 Switch 7; D15 — J5-15, J5-2 — J2-2 Led7 C; J2-10 Led7 A
S27 — J2-7 Switch 8; D23 — J5-16, J5-1 — J2-1 Led8 C; J2-9 Led8 A; J2-8 +15V; J2-15 GND

S2 Timer Start — J3-4 Timer Start
S8 Timer Stop — J3-5 Timer Stop
S9 Timer Reset — J3-6 Timer Reset
S10 Clock/Timer Mode — J3-3 Clock/Timer Mode
D29 1N4148; D30 1N4148

Timer Auto Start J3-7 — R1-1 10K; R1-A 10K — Q8 2N7000; Q9 2N7000 — Q5 2N7000

+15VD — D26 1N4005 — U1 7805 (IN, OUT, COM) — +5V
C1 100UF; C2 100UF; C6 .1UF; C7 .1UF; C3 .1UF; D27 1N4735A

Follow Control J4-14
+15V J4-16
+15V J9-1
+15V J10-1
GND J4-8
Follow Control J4-3
Monitor Defeat J4-13
GND J9-2
GND J10-2
7.5V J4-9 — +7.5V

Front Panel Monitor Level Control — +7.5V — Bottom of Fader J8-3
Fader Wiper J8-2 — R26 1K — C10 100UF — R27 100 — J4-11 Monitor Level
Top of Fader J8-1

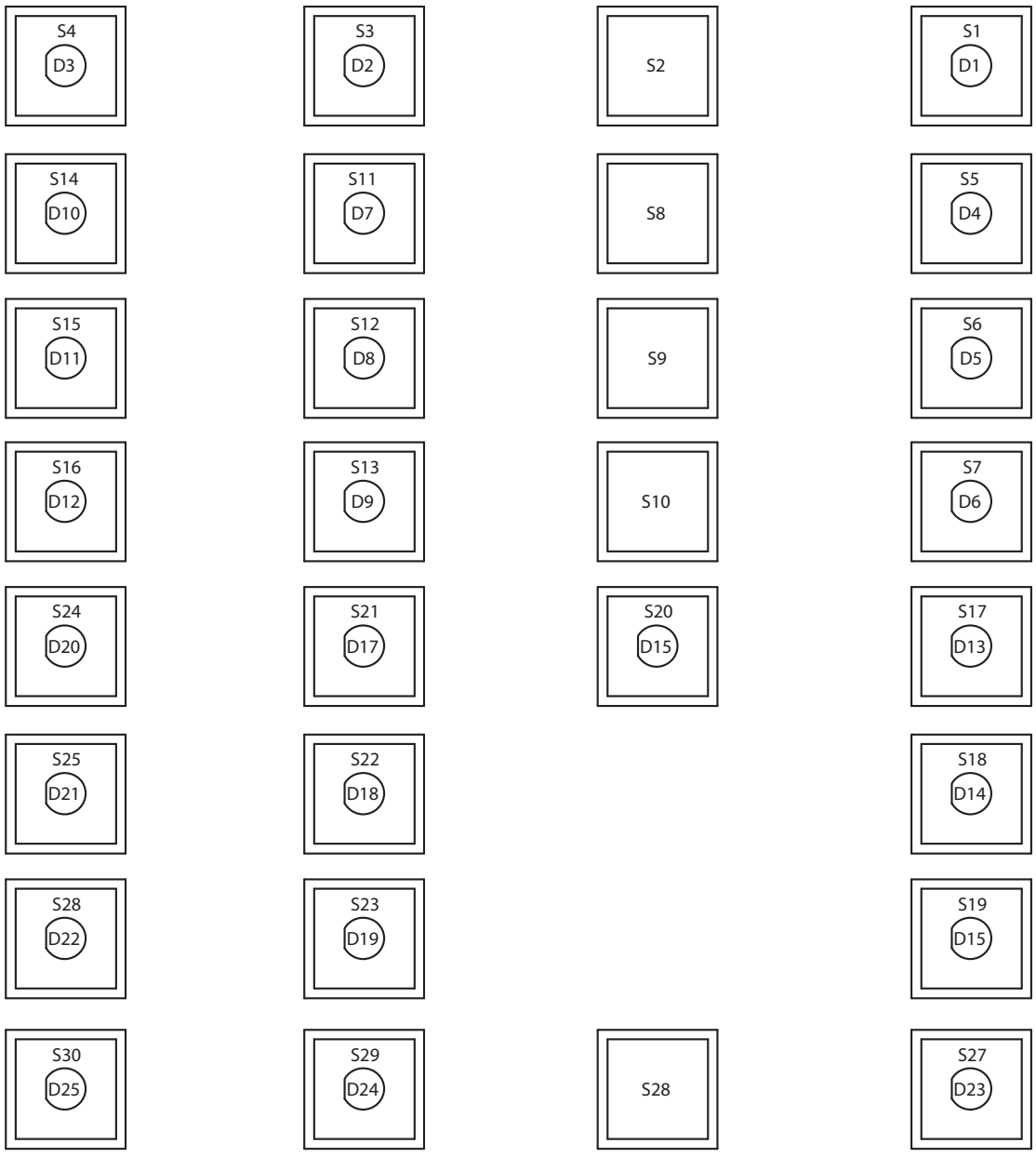
Front Panel Headphone Level Control — +7.5V — Bottom of Fader J7-3
Fader Wiper J7-2 — R24 1K — C9 100UF — R25 100 — J4-12 Headphone Level
Top of Fader J7-1

Front Panel Cue Level Control — +7.5V — Bottom of Fader J6-3
Fader Wiper J6-2 — R22 1K — C8 100UF — R23 100 — J4-10 Cue Level
Top of Fader J6-1

Talk Back Control J4-1 — S28 Talk Back

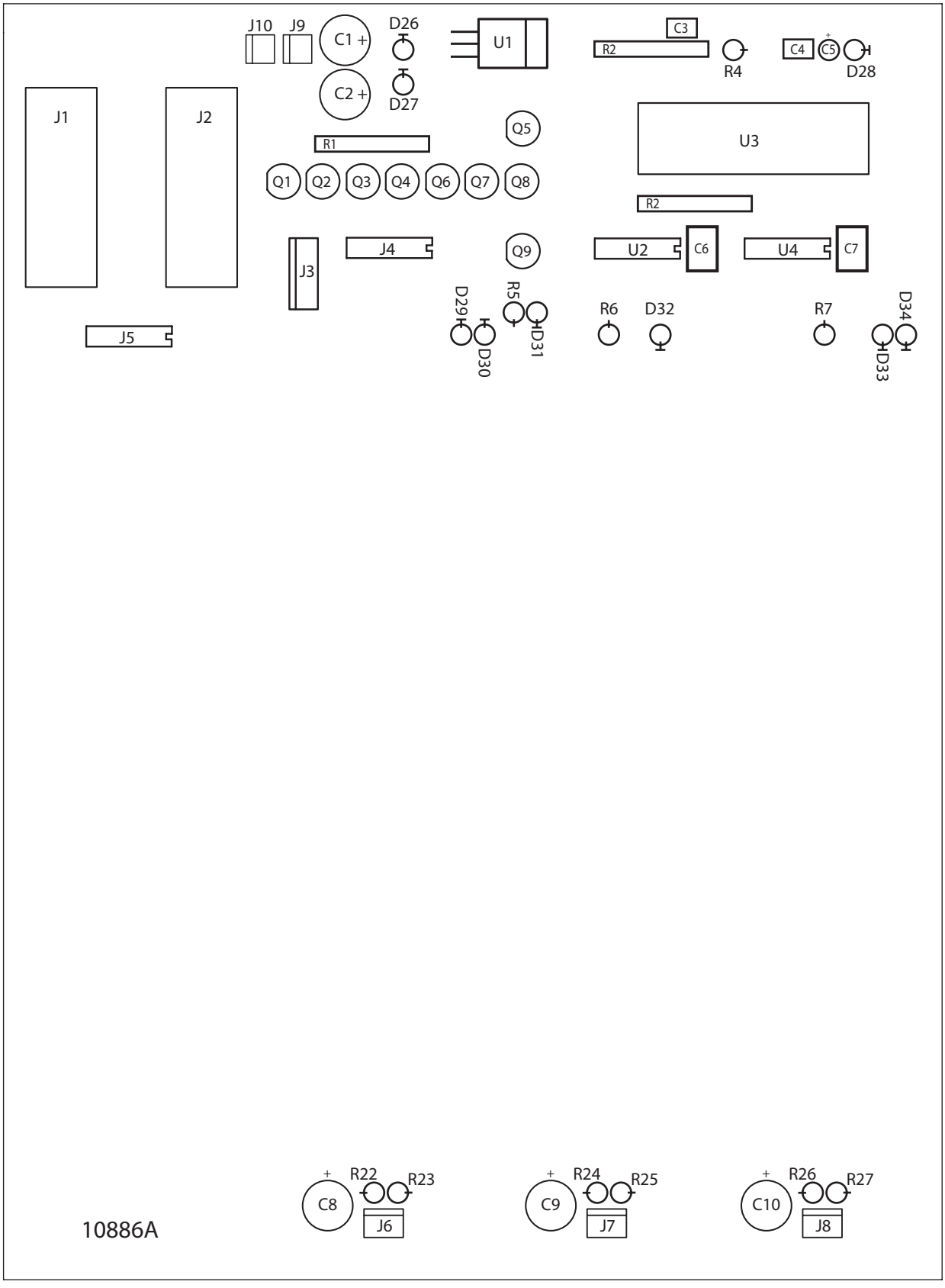
COMPANY: RADIO SYSTEMS			
TITLE: RS12A MONITOR PHONES CLOCK CONTROL BOARD			
DRAWN: SIRKIS	DATED: 4-15-97		
CHECKED:	DATED:	CODE:	SIZE: D
QUALITY CONTROL:	DATED:	DRAWING NO: Blank Board 10886A Assembly 10887A	REV:
RELEASED:	DATED:	SCALE:	SHEET:1 OF 1

D-6



10886A

radio SYSTEMS Logan Township, NJ		TITLE: MONITOR BOARD
		TYPE: PARTS LAYOUT
MILLENIUM RS-A CONSOLE	DATE: 7-29-2008	PART NO: 10887 REV: E

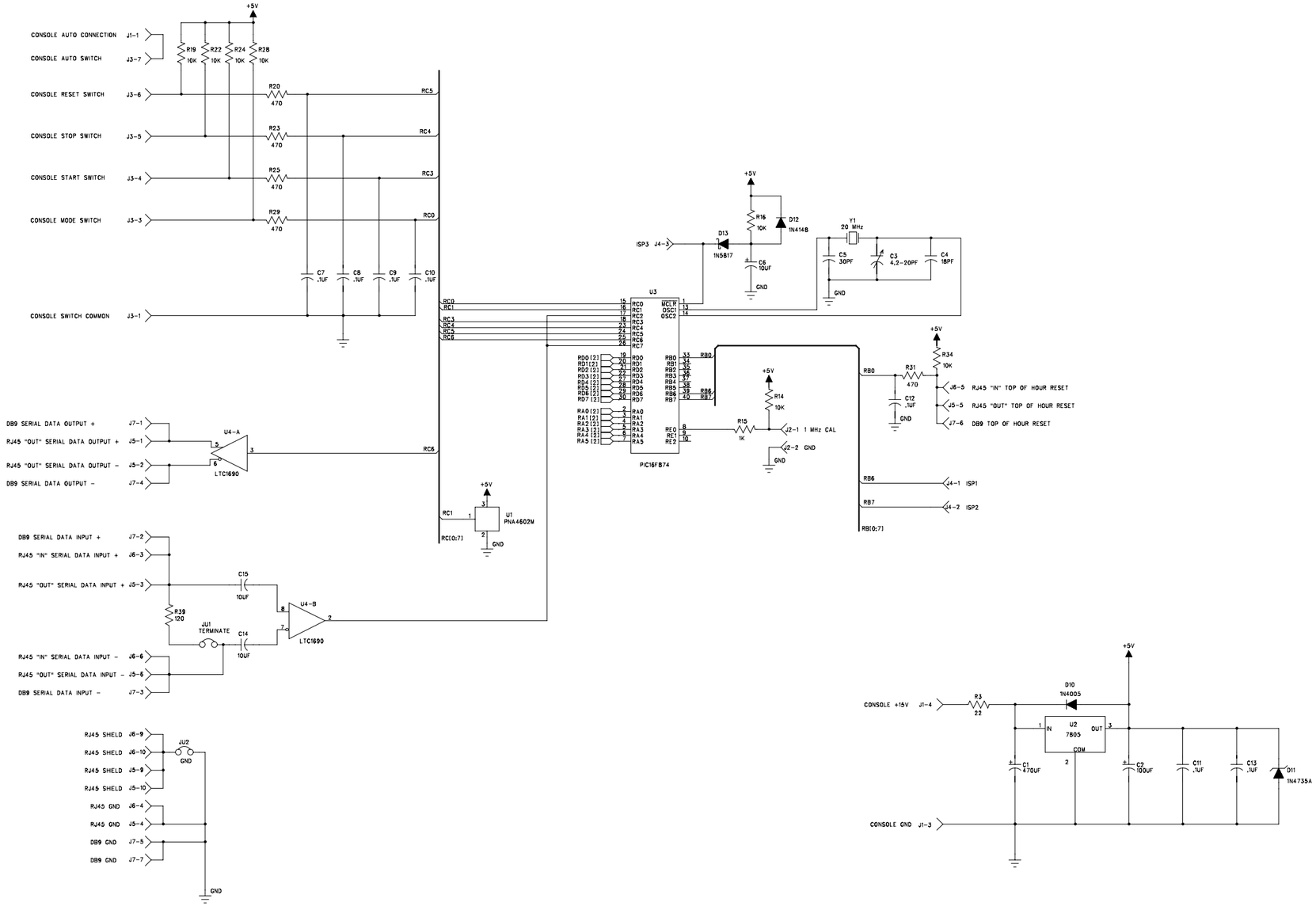


radio SYSTEMS Logan Township, NJ	TITLE: MONITOR BOARD	
	TYPE: PARTS LAYOUT	
MILLENIUM RS-A CONSOLE	DATE: 7-29-2008	PART NO: 10887 REV: A

MONITOR BOARD PARTS LIST

LINE	PART #	DESCRIPTION REFERENCE DESIGNATION	QTY.
3	10886	PCB MONITOR BD	1
20	7602	SHOULDER WASHER FOR TO-220	25
30	5744	CAP 100UF 25V RAD 20% Ref: C1;C2;C8;C9;C10	5
40	5743	CAP .1UF FILM Ref: C3;C6;C7	3
50	9124	CAP 100 PF SILVER MICA Ref: C4	1
60	8191	CAP 10UF 35V ELEC Ref: C5	1
70	13051	3MM RED LED HI BRIGHTNESS Ref: D1;D2;D3;D4;D5;D6;D7;D8;D9;D10;D11;D12;D13;D14; D15;D16;D17;D18;D19;D20;D21;D22;D23;D24;D25	25
80	7012	DIODE 1N4005 Ref: D26	1
90	7786	DIODE 1N4735A Ref: D27	1
100	1012	DIODE 1N4148 Ref: D28;D29;D30;D31;D32;D33;D34	7
110	10928	15 PIN D-SUB PC MT STRAIGHT Ref: J1;J2	2
120	5890	HEADER 7 PIN MTA .1 Ref: J3	1
130	11157	RESISTOR NETWORK DIP 680 OHMS Ref: J5	1
140	5892	HEADER 3 PIN MTA .1 Ref: J6;J7;J8	3
150	7050	HEADER 2 PIN MTA .1 Ref: J9;J10	2
160	10328	TRANSISTOR 2N7000 Ref: Q1;Q2;Q3;Q4;Q5;Q6;Q7;Q8;Q9	9
170	10326	RES NETWORK 10K Ref: R1;R2;R3	3
180	5872	RES 1.0K 1/4W 1% Ref: R22;R24;R26	3
190	1143	RES 100 OHM 1/4W 1% Ref: R23;R25;R27	3
200	7514	RES 3.32K 1/4W 1% Ref: R4	1
210	7533	RES 220 OHM 1/4W 5% Ref: R5;R6;R7	3
220	1039	SOCKET 16 PIN DIP Ref: REF;U2;U4;J4;J5	4
230	8228	SOCKET 40 PIN IC Ref: REF;U3	1
240	3679	VR 7805 Ref: U1	1
250	10891	IC 74HC147N Ref: U2;U4	2
260	11046	IC PROGRAMMED MONITOR BD Ref: U3	1

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:
B	ADD C14, C15		5-9-03



COMPANY: RADIO SYSTEMS INC				
TITLE: CLOCK/TIMER CT2002 CONSOLE VERSION				
DRAWN: SIRKIS	DATED: 7-29-2008	CODE:	SIZE: D	DRAWING NO: BLANK BOARD 144008 ASSEMBLY 144018 REV:
CHECKED:	DATED:			
QUALITY CONTROL:	DATED:			
RELEASED:	DATED:			
SCALE: NONE				SHEET: 1 OF 2

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:
B	ADD C14, C15		5-9-03

RD0 [1] R1 2.2K, R2 2.2K, Q7 2N4403, R4 100
RD1 [1] R5 2.2K, R6 2.2K, Q8 2N4403, R7 100
RD2 [1] R26 2.2K, R27 2.2K, Q11 2N4403, R30 100
RD3 [1] R32 2.2K, R33 2.2K, Q12 2N4403, R35 100
RD4 [1] R36 2.2K, R37 2.2K, Q13 2N4403, R38 100
RD5 [1] R11 2.2K, R12 2.2K, Q9 2N4403, R13 100
RD6 [1] R17 2.2K, R18 2.2K, Q10 2N4403, R21 100
RD7 [1] R40 2.2K, R41 2.2K, Q14 2N4403, R42 100

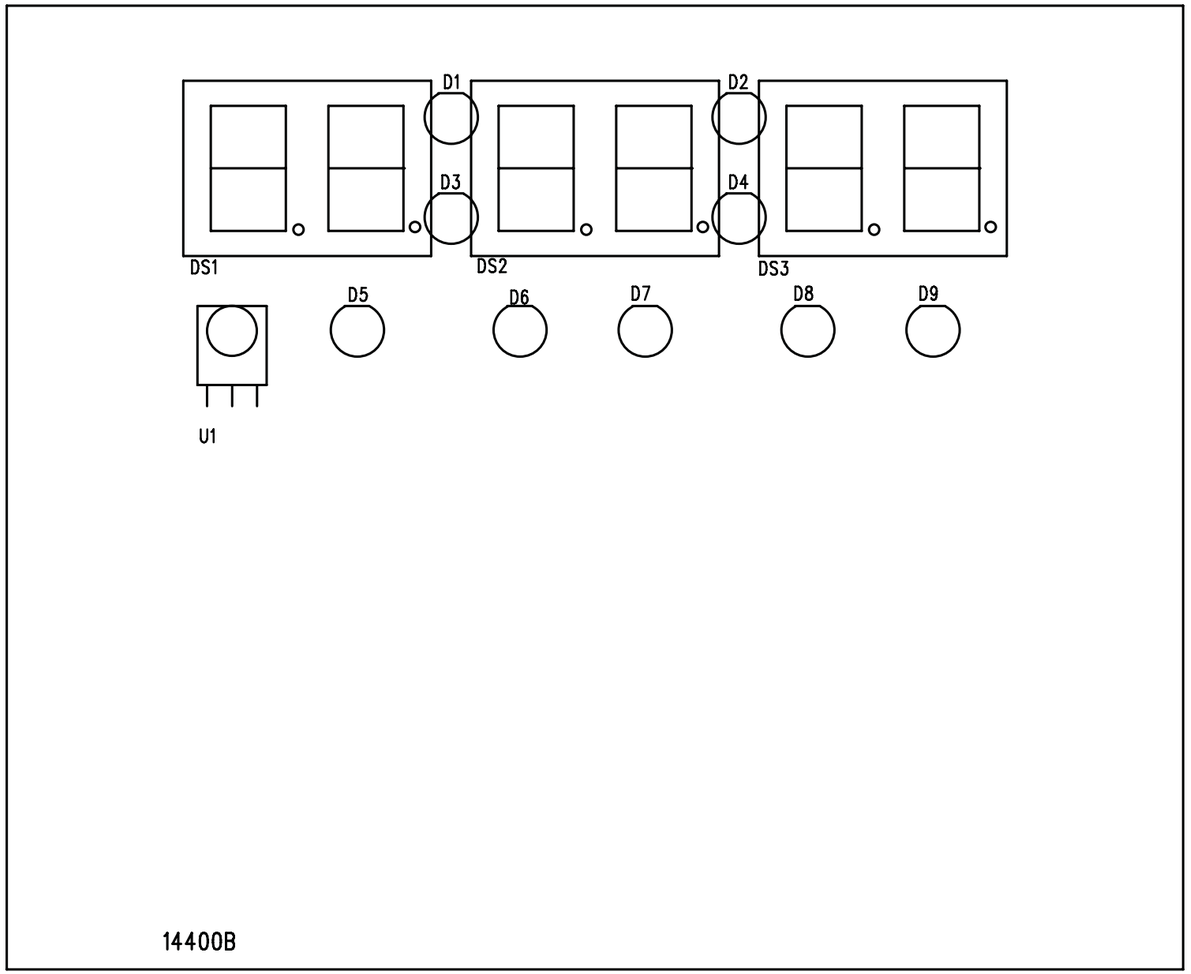
DS1 DUALLED7CC
DS2 DUALLED7CC
DS3 DUALLED7CC
D5 D6 D7 D8 D9

RA5 [1] Q6 2N7000
RA4 [1] R10 1K, Q5 2N7000
RA3 [1] Q4 2N7000
RA2 [1] Q3 2N7000
RA1 [1] Q2 2N7000
RA0 [1] Q1 2N7000

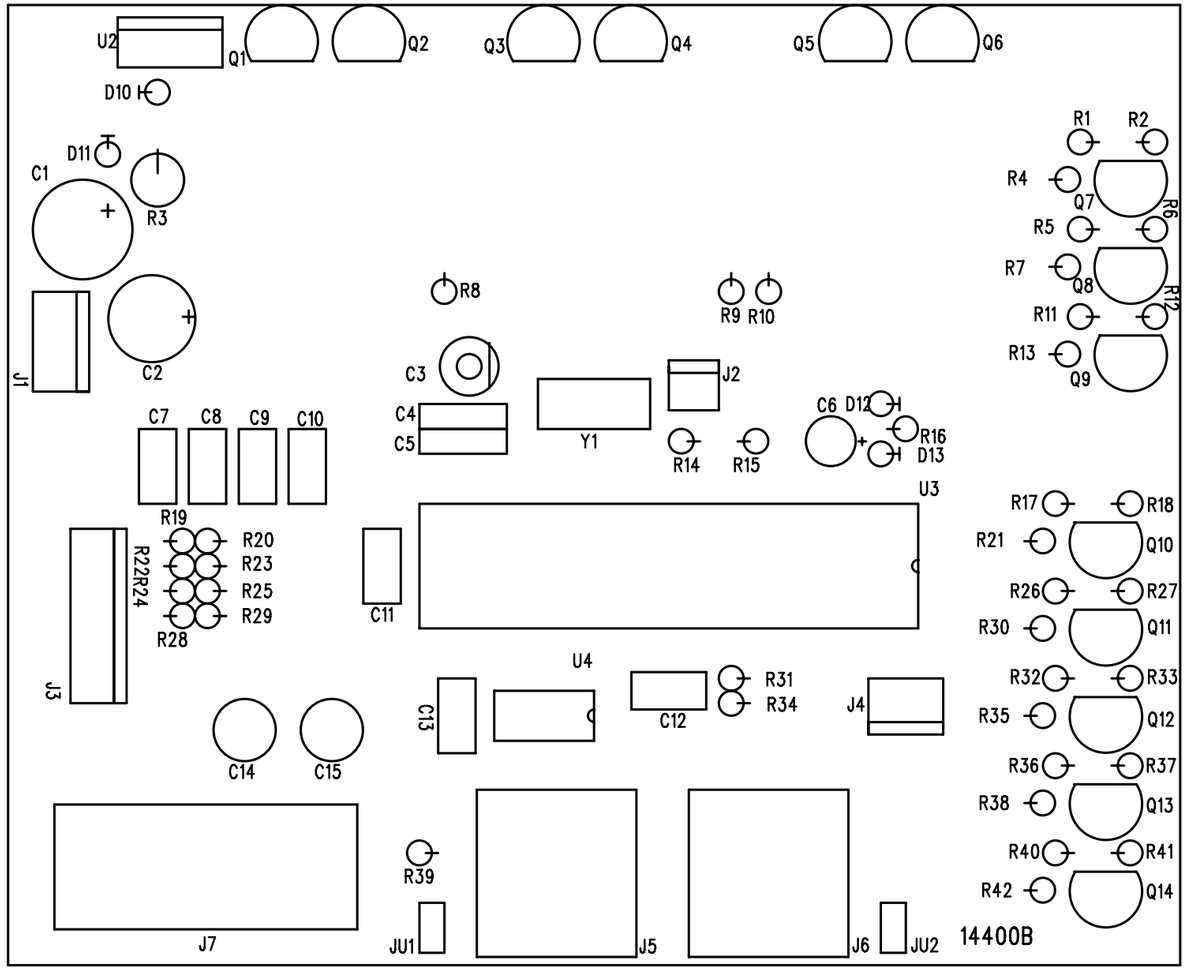
R9 270, R8 270
D3 D4 D1 D2
COLON LEDS

D-11

DRAWN: SIRKIS	DATED: 7-29-2008	COMPANY: RADIO SYSTEMS	
CHECKED:	DATED:	TITLE: CLOCK/TIMER CT2002 CONSOLE VERSION	
QUALITY CONTROL:	DATED:	CODE:	SIZE: D; DRAWING NO: BLANK BOARD 144008, ASSEMBLY 144018; REV:
RELEASED:	DATED:	SCALE: NONE	SHEET: 2 OF 2



CT2002 CLOCK/TIMER CONSOLE VERSION
BLANK BOARD 14400B
ASSEMBLY 14401B



CT2002 CLOCK/TIMER CONSOLE VERSION
BLANK BOARD 14400B
ASSEMBLY 14401B

CT-2002 CLOCK/TIMER PARTS LIST

LINE	PART #	DESCRIPTION	QTY.
		REFERENCE DESIGNATION	
10	14400	CT-2002 CONSOLE C/T DETAIL	1
20	5729	RES 2.21K 1/4W 1%	16
		Ref: R1;R2;R5;R6;R12;R11;R18;R17;R27;R26;R33;R32;R37;R36;R41;R40	
30	2816	RES 10.0K 1/4W 1%	7
		Ref: R22;R28;R24;R34;R14;R16;R19	
40	1143	RES 100 OHM 1/4W 1%	7
		Ref: R4;R7;R13;R35;R21;R38;R30;	
50	1030	RES 470 OHM 1/4W 5%	5
		Ref: R20;R23;R25;R29;R31	
60	9806	RES 120 OHM 1/4W 5%	1
		Ref: R39	
70	3558	RES 5.11K 1/4W 1%	2
		Ref: R8;R9	
80	5872	RES 1.0K 1/4W 1%	2
		Ref: R10;R15	
90	10815	RES 22 OHM 3W 5%	1
		Ref: R3	
100	5743	CAP .1UF FILM	7
		Ref: C7 THRU C13	
110	8192	CAP 30PF SILVER MICA	1
		Ref: C5	
120	7012	DIODE 1N4005	1
		Ref: D10	
130	1012	DIODE 1N4148	1
		Ref: D12	
140	9330	DIODE 1N5817	1
		Ref: D13	
150	7786	DIODE 1N4735A	1
		Ref: D11	
160	13051	3MM RED LED HI BRIGHTNESS	9
		Ref: D1 THRU D9	
170	10927	CAP 4.2-20PF TRIMMER	1
		Ref: C3	
180	10797	LED DUAL SEVEN SEGMENT RED	3
		Ref: DS1;DS2;DS3	
190	5744	CAP 100UF 25V RAD 20%	1
		Ref: C2	
200	8191	CAP 10UF 35V ELEC	1
		Ref: C6	
220	6119	TRANSISTOR 2N4403	8
		Ref: Q7 THRU Q14	
230	10328	TRANSISTOR 2N7000	6
		Ref: Q1 THRU Q6	

LINE	PART #	DESCRIPTION REFERENCE DESIGNATION	QTY.
240	3679	VR 7805 Ref: U2	1
260	14505	IC LTC1690 Ref: U4	1
270	14359	PHOTODETECTOR Ref: U1	1
280	1011	SOCKET 8 PIN DIP Ref: REF;U4	1
290	8228	SOCKET 40 PIN IC Ref: REF; U3	1
300	11338	RJ45 VERTICAL SHIELDED Ref: J5;J6	2
310	14504	CONNECTOR 9 PIN D FEMALE Ref: J7	1
320	7050	HEADER 2 PIN MTA .1 Ref: J2	1
330	5892	HEADER 3 PIN MTA .1 Ref: J4	1
340	7051	HEADER 4 PIN MTA .1 Ref: J1	1
350	5890	HEADER 7 PIN MTA .1 Ref: J3	1
360	7903	HEADER 2 PIN SINGLE ROW .1 Ref: JU1;JU2	2
370	2846	HEAT SINK T0-220 Ref: REF; U2	1
390	9292	NUT KEP #4 Ref: REF; U2	1
400	7601	SIL-PAD TO-220 Ref: REF;U2	1
410	11073	LED SPACER Ref: REF; D5 THRU D9	5
420	5758	JUMPER PLUG .1 Ref: REF; JU1;JU2	2
430	7535	CAP 470 UF 25V ELEC Ref: C1	1
440	13132	CRYSTAL 20 MHZ Ref: Y1	1
450	11072	LED SPACER Ref: REF;D1;D2;D3;D4	4
480	7281	CAP 18PF SILVER MICA Ref: C4	1
490	14506	IC PIC16F874 Ref: U3	1

LINE	PART #	DESCRIPTION REFERENCE DESIGNATION	QTY.
500	9320	SCREW PHIL PH 4-40 X 5/16 Ref: REF; U2	1
510	1014	CAP 10UF 25V NP Ref: C14;C15	2
520	7792	RES 1.62K 1/4W 1%	1

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

COMPANY:	RADIO SYSTEMS LOGAN TOWNSHIP, NJ	
TITLE:	MILLENIUM-A 6 CHANNEL AUDIO BOARD SMT	
DRAWN: SIRKIS	DATED: 7-29-2008	
CHECKED:	DATED:	
QUALITY CONTROL:	DATED:	
RELEASED:	DATED:	
CODE:	SIZE: D	DRAWING NO: BLANK BOARD 16794 ASSEMBLY 5 PIN 16795 ASSEMBLY RJ45 16796
REV:		
SCALE: NONE	SHEET: 1 OF 6	

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

DRAWN: SIRKIS	DATED: 7-29-2008	COMPANY: RADIO SYSTEMS	
CHECKED:	DATED:	TITLE: MILLENIUM-A 6 CHANNEL AUDIO BOARD SMT	
QUALITY CONTROL:	DATED:	CODE:	SIZE: D
RELEASED:	DATED:	DRAWING NO: BLANK BOARD 16794 ASSEMBLY 5 PIN 16795 ASSEMBLY RJ45 16796	REV:
		SCALE: NONE	SHEET: 2 OF 6

D-17

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

INPUT_3A_L+ [3] J30-9 J30-6 R36 7.87K R60 5.76K J30-7 C65 10UF R84 1.00M C23 100PF C6 100PF C24 10UF R108 1.00M GNDA
INPUT_3A_L- [3] R12 7.87K J30-8 J30-5 J30-10
J30-4 N.C.
J30-11 N.C.
INPUT_3A_R- [3] J30-14 J30-1 R11 7.87K J30-3 R59 5.76K C82 10UF R82 1.00M C5 100PF C41 100PF C65 10UF R105 1.00M GNDA
INPUT_3A_R+ [3] R35 7.87K J30-12 J30-2 J30-13
INPUT_3B_L+ [3] J29-9 J29-6 R34 7.87K J29-7 R58 5.76K C83 10UF R83 1.00M C54 100PF C42 100PF C84 10UF R107 1.00M GNDA
INPUT_3B_L- [3] R10 7.87K J29-8 J29-5 J29-10
J29-4 N.C.
J29-11 N.C.
INPUT_3B_R- [3] J29-14 J29-1 R9 7.87K J29-3 R57 5.76K C81 10UF R106 1.00M C53 100PF C22 100PF C21 10UF R81 1.00M GNDA
INPUT_3B_R+ [3] R33 7.87K J29-12 J29-2 J29-13
U8-A U5-A CD4052 GNDD
R128 10.2K +7.5V D3 4148 INPUT SELECT J54-2
R161 10.2K R330 4.75K C194 1000UF GNDA
-15VA R234 28K C111 22PF U18-A LF347 Q6 MMBT4355 -7.5VA [1,2,3,4,5,6] R208 5.11K R129 5.11K R144 1.58K R162 365 R186 19.1 GAIN SELECT JU42-A JU42-B JU42-C R210 5.11K U18-D LF347 C112 22PF R235 28K R185 10.2K GNDA
R258 10.2K R306 5.11K U18-B LF347 R259 10.2K R282 5.11K R331 392 C157 10UF R382 100K R361 4.02K
PATCH POINT BYPASS JUMPERS JU54 LEFT
PATCH POINT J41-2 LEFT OUT
J41-1 LEFT IN
J41-3 GND
J41-5 RIGHT IN
J41-4 RIGHT OUT
JU53 MONO RIGHT
Q39 P1086 CUE_MIX_BUS [1,2,4,5,6]
+15VD R531 100K J54-1 CUE SELECT R547 100K C272 .1UF
R373 1.10K R360 4.02K C266 10UF R532 10.2K
Q17 MMBT4355 -7.5VA [1,2,3,4,5,6] R233 28K C110 22PF U17-D LF347 R208 5.11K R184 10.2K JU41-A JU41-B JU41-C GAIN SELECT R127 5.11K R183 1.58K R159 365 R143 19.1 R207 5.11K
R257 10.2K R281 5.11K U17-C LF347 R305 5.11K R255 10.2K R304 392 C156 10UF R372 100K
Q5 MMBT4355 -7.5VA [1,2,3,4,5,6] U17-A LF347 C109 22PF R232 28K
R150 10.2K R329 4.75K C193 1000UF GNDA
+15VD J54-13 J54-14 +7.5V J54-10
C176 10UF R349 10.2K C145 47PF R307 10.2K R283 20K U18-C LF347 C175 10UF R412 15K
+15VA VR9 50K -15VA R418 220K U33 2181BL C239 47PF R458 20K U41-A NE5532 C254 100UF
J47-1 LEFT OUT POST FADER PRE ON/OFF
R520 2K R514 2K R508 2K R480 10.2K U53-A CD4053
R614 2K LEFT_AUD_MIX_BUS [1,2,4,5,6]
R615 2K MONO_MIX_BUS [1,2,4,5,6]
R616 2K LEFT_PGM_MIX_BUS [1,2,4,5,6]
R388 4.02K
+7.5V R472 100K FADER DC J54-15 U42-B RC4558 R430 68.1K U42-A RC4558 R448 4.75K Q27 MMBT4355 R436 2.21K C204 .1UF R442 187K R460 47.5K Q33 MMBT4355 R424 2.21K C241 10UF R481 10.2K R493 27.4K R502 27.4K
R562 100K D9 4148 J54-3 MIX BUS CONTROL
R546 10.2K R582 10.2K J54-5 MONO SELECT
R530 10.2K R598 10.2K J54-6 AUDITION SELECT
R556 10.2K R586 10.2K J54-4 PROGRAM SELECT
U54-A CD4053
C173 10UF R348 10.2K C144 47PF R328 10.2K R280 20K U17-B LF347 C174 10UF R406 15K
+15VA C240 47PF R459 20k U41-B NE5532 C260 100UF
R573 2K R574 2K R572 2K R492 10.2K
R617 2K RIGHT_AUD_MIX_BUS [1,2,4,5,6]
R618 2K RIGHT_PGM_MIX_BUS [1,2,4,5,6]
R619 2K
R384 4.02K R400 220K VR3 50K
J47-3 RIGHT OUT POST FADER PRE ON/OFF
J47-2 GND
INPUT 3B L+ J5-1
INPUT 3B L- J5-2
INPUT 3B R+ J5-3
INPUT 3B R- J5-6
INPUT GND J5-9
INPUT 3B L+ J17-1 INPUT_3B_L+ [3]
INPUT 3B L- J17-2 INPUT_3B_L- [3]
INPUT GND J17-3
INPUT 3B R- J17-4 INPUT_3B_R- [3]
INPUT 3B R+ J17-5 INPUT_3B_R+ [3]
JU22 STEREO MONO
JU21 STEREO MONO
INPUT 3A L+ J6-1
INPUT 3A L- J6-2
INPUT 3A R+ J6-3
INPUT 3A R- J6-6
INPUT GND J6-9
INPUT 3A L+ J18-1 INPUT_3A_L+ [3]
INPUT 3A L- J18-2 INPUT_3A_L- [3]
INPUT GND J18-3
INPUT 3A R- J18-4 INPUT_3A_R- [3]
INPUT 3A R+ J18-5 INPUT_3A_R+ [3]
JU24 STEREO MONO
JU23 STEREO MONO
JU5 CHGND
JU6 CHGND INPUT GND
GNDD J54-8
GNDD J54-9 GNDD
GNDA J54-16 GNDA
MUTE1 J54-11 MUTE1 [1,2,4,5,6]
MUTE2 J54-7 MUTE2 [1,2,4,5,6]
TIMER RESET J54-12 TIMER_RESET [1,2,4,5,6]
+7.5V U5-B CD4052 U6-B CD4052 U54-B CD4053 U53-B CD4053 VDD VEE VSS -7.5V GNDD
+15VA U18-E LF347 U17-E LF347 U42-C RC4558 U41-C NE5532 C219 .1UF C217 .1UF C135 .1UF C218 .1UF C220 .1UF C128 .1UF -15VA GNDA

DRAWN: SIRKIS	DATED: 7-29-2008	COMPANY: RADIO SYSTEMS	
CHECKED:	DATED:	TITLE: MILLENIUM-A 6 CHANNEL AUDIO BOARD SMT	
QUALITY CONTROL:	DATED:	CODE:	SIZE: D
RELEASED:	DATED:	DRAWING NO: BLANK BOARD 16794 ASSEMBLY 5 PIN 16795 ASSEMBLY RJ45 16796	REV:
		SCALE: NONE	SHEET: 3 OF 6

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

INPUT_4A_L+ [4] — J32-9 — R40 7.87K — J32-7 — R64 5.76K
INPUT_4A_L− [4] — J32-6 — R16 7.87K — J32-8 — R64 5.76K
J32-5 J32-10 J32-4 N.C. J32-11 N.C.
C65 10UF — C27 100PF — R88 1.00M — C8 100PF — C28 10UF — R112 1.00M — GNDA
INPUT_4A_R− [4] — J32-14 — R15 7.87K — J32-3 — R63 5.76K
INPUT_4A_R+ [4] — J32-1 — R39 7.87K — J32-12 — R63 5.76K
J32-2 J32-13
C86 10UF — C7 100PF — R86 1.00M — C43 100PF — C67 10UF — R109 1.00M — GNDA
INPUT_4B_L+ [4] — J31-9 — R38 7.87K — J31-7 — R62 5.76K
INPUT_4B_L− [4] — J31-6 — R14 7.87K — J31-8 — R62 5.76K
J31-5 J31-10 J31-4 N.C. J31-11 N.C.
C87 10UF — C56 100PF — R87 1.00M — C44 100PF — C68 10UF — R111 1.00M — GNDA
INPUT_4B_R− [4] — J31-14 — R13 7.87K — J31-3 — R61 5.76K
INPUT_4B_R+ [4] — J31-1 — R37 7.87K — J31-12 — R61 5.76K
J31-2 J31-13
C85 10UF — C55 100PF — R110 1.00M — C26 100PF — C25 10UF — R85 1.00M — GNDA
U8-A CD4052: X0 Y0 X1 Y1 INH A B — GNDD
U7-A CD4052: X0 Y0 X1 Y1 INH A B — GNDD

R165 10.2K — R334 4.75K — C196 1000UF — GNDA
−15VA — R238 28K — C115 22PF — U20-A LF347
Q8 MMBT4355 [1,2,3,4,5,6] — −7.5VA [1,2,3,4,5,6]
R213 5.11K — R262 10.2K — R310 5.11K — U20-B LF347
R132 5.11K — R146 1.58K — R166 365 — R190 19.1 — GAIN SELECT
JU44-A JU44-B JU44-C — R263 10.2K — R288 5.11K — GNDA
R214 5.11K — U20-D LF347 — C116 22PF — R239 28K — −15VA
Q20 MMBT4355 [1,2,3,4,5,6] — −7.5VA [1,2,3,4,5,6] — R189 10.2K — GNDA
R335 392 — C159 10UF — R383 100K — GNDA
R383 4.02K
+7.5V — R131 10.2K — D4 4148 — INPUT SELECT — J55-2
R375 1.10K — R362 4.02K — GNDA
PATCH POINT BYPASS JUMPERS — JU56 LEFT — PATCH POINT J42-2 LEFT OUT — J42-1 LEFT IN
JU55 MONO RIGHT — GNDA J42-3 GND — J42-5 RIGHT IN — J42-4 RIGHT OUT
C267 10UF — R535 10.2K — GNDA
Q40 P1086 — CUE_MIX_BUS [1,2,3,5,6]
+15VD — R534 100K — J55-1 CUE SELECT — R549 100K — C273 .1UF — GNDA

−15VA — R237 28K — C114 22PF — U19-D LF347
Q19 MMBT4355 [1,2,3,4,5,6] — −7.5VA [1,2,3,4,5,6]
R212 5.11K — R261 10.2K — R285 5.11K — GNDA
R188 10.2K — GNDA
JU43-A JU43-B JU43-C — GAIN SELECT
R130 5.11K — R157 1.58K — R163 365 — R145 19.1
R211 5.11K — R260 10.2K — R309 5.11K — U19-C LF347
R308 392 — C158 10UF — R374 100K — GNDA
Q7 MMBT4355 [1,2,3,4,5,6] — −7.5VA [1,2,3,4,5,6]
U19-A LF347 — C113 22PF — R236 28K — −15VA
R164 10.2K — R333 4.75K — C195 1000UF — GNDA

+15VD — +15VD J55-13 — +15VD J55-14 — +7.5V J55-10 — +7.5V

INPUT 4B L+ J7-1 — INPUT 4B L− J7-2 — INPUT 4B R+ J7-3 — INPUT 4B R− J7-6
INPUT GND J7-9 — INPUT 4B L+ J19-1 — INPUT 4B L− J19-2 — INPUT GND J19-3 — INPUT 4B R− J19-4 — INPUT 4B R+ J19-5
JU26 STEREO MONO — JU25 STEREO MONO — INPUT_4B_L+ [4] — INPUT_4B_L− [4] — INPUT_4B_R+ [4] — INPUT_4B_R− [4]
INPUT 4A L+ J8-1 — INPUT 4A L− J8-2 — INPUT 4A R+ J8-3 — INPUT 4A R− J8-6
JU7 — CHGND — INPUT GND
INPUT GND J8-9 — INPUT 4A L+ J20-1 — INPUT 4A L− J20-2 — INPUT GND J20-3 — INPUT 4A R− J20-4 — INPUT 4A R+ J20-5
JU28 STEREO MONO — JU27 STEREO MONO — INPUT_4A_L+ [4] — INPUT_4A_L− [4] — INPUT_4A_R+ [4] — INPUT_4A_R− [4]
GNDA — JU8 — CHGND — INPUT GND

GNDD J55-8 — GNDD J55-9 — GNDD
GNDA J55-16 — GNDA
MUTE1 J55-11 — MUTE1 [1,2,3,5,6]
MUTE2 J55-7 — MUTE2 [1,2,3,5,6]
TIMER RESET J55-12 — TIMER_RESET [1,2,3,5,6]

U7-B CD4052 — U8-B CD4052 — U56-B CD4053 — U55-B CD4053 — VDD VEE VSS — +7.5V — −7.5V — GNDD

U20-E LF347 — U19-E LF347 — U44-C RC4558 — U43-C NE5532 — +15VA — −15VA — GNDA
C223 .1UF — C221 .1UF — C136 .1UF — C222 .1UF — C224 .1UF — C129 .1UF

C150 10UF — R351 10.2K — C147 47PF — R311 10.2K — R287 20K — U20-C LF347 — C179 10UF — R413 15K
+15VA — U34 2181BL — V+ EC+1 -IN OUT EC+2 GND V- EC- — R389 4.02K — −15VA
VR10 50K — R419 220K — C242 47PF — R461 20k — U43-A NE5532 — C255 100UF
J48-1 LEFT OUT POST FADER PRE ON/OFF — R482 10.2K — R521 2K — R515 2K — R509 2K — U55-A CD4053
BX CX AX BY CY AY A/OI B/OI C/OI INH A B C — R620 2K — R621 2K — R622 2K
LEFT_AUD_MIX_BUS [1,2,3,5,6] — MONO_MIX_BUS [1,2,3,5,6] — LEFT_PGM_MIX_BUS [1,2,3,5,6]

FADER DC J55-15 — U44-B RC4558 — R473 100K — R431 68.1K — U44-A RC4558
R449 4.75K — Q28 MMBT4355 — R437 2.21K — C205 .1UF — R443 187K — +7.5V
R483 10.2K — R495 27.4K — R503 27.4K — R463 47.5K — Q34 MMBT4355 — R425 2.21K — C244 10UF — GNDA

C177 10UF — R350 10.2K — C146 47PF — R332 10.2K — R284 20K — U19-B LF347 — C178 10UF — R407 15K
U28 2181BL — V+ EC- -IN OUT EC+2 GND V- EC+1 — R395 4.02K — R401 220K — VR4 50K — −15VA
C243 47PF — R462 20k — U43-B NE5532 — C251 100UF — R494 10.2K
J48-3 RIGHT OUT POST FADER PRE ON/OFF — J48-2 GND
R576 2K — R577 2K — R575 2K — U56-A CD4053 — R623 2K — R624 2K — R625 2K
RIGHT_AUD_MIX_BUS [1,2,3,5,6] — RIGHT_PGM_MIX_BUS [1,2,3,5,6]

+7.5V — R563 100K — D10 4148 — J55-3 MIX BUS CONTROL
R548 10.2K — R593 10.2K — J55-5 MONO SELECT
R533 10.2K — R599 10.2K — J55-6 AUDITION SELECT
R557 10.2K — R587 10.2K — J55-4 PROGRAM SELECT
GNDD

DRAWN: SIRKIS	DATED: 7-29-2008	COMPANY: RADIO SYSTEMS	
CHECKED:	DATED:	TITLE: MILLENIUM-A 6 CHANNEL AUDIO BOARD SMT	
QUALITY CONTROL:	DATED:	CODE:	SIZE: D
RELEASED:	DATED:	DRAWING NO: BLANK BOARD 16794 ASSEMBLY 5 PIN 16795 ASSEMBLY RJ45 16796	REV:
		SCALE: NONE	SHEET: 4 OF 6

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

DRAWN: SIRKIS	DATED: 7-29-2008
CHECKED:	DATED:
QUALITY CONTROL:	DATED:
RELEASED:	DATED:

COMPANY: RADIO SYSTEMS

TITLE: MILLENIUM-A 6 CHANNEL AUDIO BOARD SMT

CODE:	SIZE:	DRAWING NO:	REV:
	D	BLANK BOARD 16794 ASSEMBLY 5 PIN 16795 ASSEMBLY RJ45 16796	

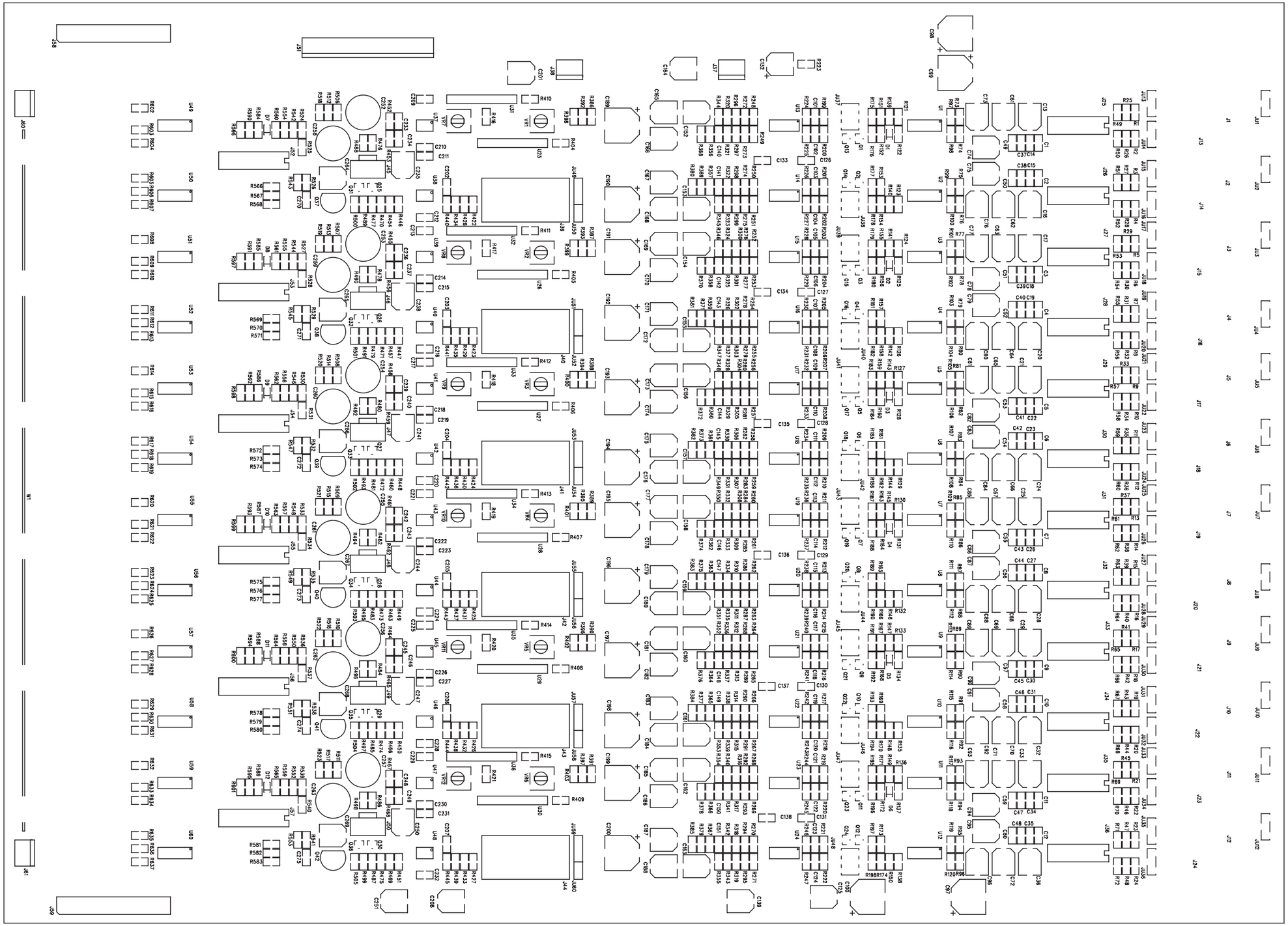
SCALE: NONE SHEET: 5 OF 6

D-20

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

DRAWN: SIRKIS	DATED: 7-29-2008	COMPANY: RADIO SYSTEMS
CHECKED:	DATED:	TITLE: MILLENIUM-A 6 CHANNEL AUDIO BOARD SMT
QUALITY CONTROL:	DATED:	CODE: / SIZE: D / DRAWING NO: BLANK BOARD 16794, ASSEMBLY 5 PIN 16795, ASSEMBLY RJ45 16796 / REV:
RELEASED:	DATED:	SCALE: NONE / SHEET: 6 OF 6

D-21



DRAWN: SIRKIS	DATED: 7-29-2008	COMPANY: RADIO SYSTEMS	
CHECKED:	DATED:	TITLE: SIX CHANNEL AUDIO BOARD - RJ-45 VERSION	
QUALITY CONTROL:	DATED:	CODE:	SIZE: D
RELEASED:	DATED:	DRAWING NO: Blank Board 16794 Assembly 16796	REV:
		SCALE:	SHEET:1 OF 1

SIX CHANNEL CONTROL BOARD PARTS LIST

LINE	PART #	DESCRIPTION REFERENCE DESIGNATION	QTY.
10	16794	PCB SMT SIX CHANNEL AUDIO BD	1
20	10731	RES SMT 1.0M 1/10W 1% Ref: R73-R120	48
30	16907	RES SMT 1.58K Ref: R140;142;144;146;148;150;175;179;183;187;191;195	12
40	10726	RES SMT 10.2K 1/10W 1% Ref: R122;125;128;131;134;137;152;153;156;157;160;161;164; 165;168;169;172;173;176;177;180;181;184;185;188;189;192; 193;196;197;223;248-271;299;303;307;311;315;319;320;324; 328;332;336;340	70
50	10726	RES SMT 10.2K 1/10W 1% Ref: R344-355; 476-488; 490;492;494;496;498;524;526;527; 529;530;532;533;535;536;538;539;541;542;544;546;548;550; 552;554-559; 584-601	69
60	16021	RES SMT 100K 1/8W 1% Ref: R368;370;372;374;376;378; 380-385; 470-475; 525;528; 531;534;537;540;543;545;547;549;551;553;560;565	36
70	16908	RES SMT 15K Ref: R404-415	12
80	16909	RES SMT 187K Ref: R440-445	6
90	16910	RES SMT 19.1 OHM Ref: R139;141;143;145;147;149;178;182;186;190;194;198	12
100	14424	RES SMT 2.2K Ref: R422-427; 434-439	12
110	16074	RES SMT 20.0K OHM 1/8W 1% Ref: R272;275;276;279;280;283;284;287;288;291;292;295; 452;453;455;456;458;459;461;462;464;465;467;468	77
120	16911	RES SMT 220K Ref: R398-403; 416-421	12
130	16912	RES SMT 27.4K Ref: R489;491;493;495;497; 499-505	12
140	16913	RES SMT 28K Ref: R224-247	24
150	16149	RES SMT 2.00K 1/8W 1% Ref: R506-523; 566-583; 602-637	72
160	16914	RES SMT 365 OHM Ref: R151;154;155;158;159;162;163;166;167;170;171;174	12
170	16915	RES SMT 392 OHM Ref: R296;300;304;308;312;316;323;327;331;335;339;343	12
180	16399	RES SMT 4.02K OHM Ref: R356-367; 386-397	24
185	16562	RES SMT 1.1K 1/10W 1% OHM Ref: R369;371;373;375;377;379	6
190	14467	RES SMT 4.7K 1/8W 5% Ref: R321;322;325;326;329;330;333;334;337;338;341;342; 446-451	18
200	16916	RES SMT 47.5K Ref: R454;457;460;463;466;469	6
210	16351	RES SMT 5.11K OHM 1/8W 1% Ref: R121;123;124;126;127;129;130;132;133;135;136;138; 199-222;273;274;277;278;281;282;285;286;289;290;293;294; 297;298;301;302;305;306;309;310;313;314;317;318	60
220	16917	RES SMT 5.76K Ref: R49-72	24
230	16918	RES SMT 68.1K Ref: R428-433	6
240	16511	RES SMT 7.87K OHM 1/8W 1% Ref: R1-48	48

250	16919	POT SMT TRIM 50K Ref: VR1-VR12	12
260	16005	CAP SMT .1UF 50V CERM X7R Ref: C126-131; 133-138; 202-207; 209-232; 270-275	48
270	16901	CAP SMT 100PF Ref: C1-12; 14;15;18;19;22;23;26;27;30;31;34;35; 37-60	48
280	16370	CAP SMT 22PF Ref: C101-124	24
290	16346	CAP SMT 47PF 50V CERM Ref: C140-151; 233;234;236;237;239;240;242;243;245;246; 248;249	24
300	1049	CAP 100UF 25V NP Ref: C252-263	12
310	16902	CAP SMT 10UF NP Ref: C13;16;17;20;21;24;25;28;29;32;33;36; 61-96; 125;139; 152-188; 201;208;235;238;241;244;247;250;251;264;269	102
320	16643	CAP SMT 100UF Ref: C132	1
330	16903	CAP SMT 1000UF Ref: C97-100; 189-200	16
340	16512	DIODE SMT MMSD4148T1G Ref: D1-12	12
350	5751	TRANSISTOR P1086 Ref: Q37-42	6
360	16906	TRANSISTOR SMT MMBT4355 Ref: Q1-36	36
370	16900	IC SMT CD4052 Ref: U1-12	12
380	16848	IC SMT CD4053BCM Ref: U49-60	12
390	15340	IC VCA 2181LB Ref: U25-36	12
400	16905	IC SMT LF347 Ref: U13-24	12
410	16063	IC SMT NE5532D Ref: U37;39;41;43;45;47	6
420	16016	IC SMT RC4558D Ref: U38;40;42;44;46;48	6
430	15505	SOCKET SMT DIP 14 PIN Ref: J25-36	12
440	16655	SOCKET SMT DIP 16 PIN Ref: J52-57	6
450	14841	HEADER AMP 3 PIN MTE VERT Ref: J45-50	6
460	5756	HEADER 26 PIN DUAL ROW .1 Ref: J58;J59	2
470	5755	HEADER 5 PIN SINGLE ROW .1 Ref: JU50;52;54;56;58;60;49;51;53;55;57;59	6
480	16059	HEADER SMT 3 PIN Ref: JU1-36	36
490	16904	HEADER SMT 3 PIN DUAL ROW Ref: JU37-48	12
500	5892	HEADER 3 PIN MTA .1 Ref: J37;38;60;61	4
510	5749	HEADER 15 PIN MTA .1 Ref: J51	1
520	11338	RJ45 VERTICAL SHIELDED Ref: J1 THRU J12	12

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

AC IN H J6-1
AC IN N J6-3
K2-B
J10-1 SUPPLY 1 H
R4 10
J10-3 SUPPLY 1 N
90 WATT MODULE
15 VOLTS 6 AMPS
A.C. IN H
A.C. IN N
DC OUT
DC OUT
RETURN
RETURN

K2-A
J7-1 SUPPLY 4 H
R1 10
J7-3 SUPPLY 4 N
90 WATT MODULE
15 VOLTS 6 AMPS
THIS MODULE IS WIRED TO PRODUCE -15 VOLTS

K1-A
J8-1 SUPPLY 3 H
R2 10
J8-3 SUPPLY 3 N
40 WATT MODULE
5 VOLTS 8 AMPS

K1-B
J9-1 SUPPLY 2 H
R3 10
J9-3 SUPPLY 2 N
90 WATT MODULE
15 VOLTS 6 AMPS

+15V
+5V
U4 7805 IN OUT COM
C9 .1UF
C8 .1UF
GND

+15 IN J4-1
+15 IN J4-2
NC J4-3
RTN IN J4-4
RTN IN J4-5
R6 2.32K
+15V_MEASURE
R9 1K
+5V
R11 1K
R7 4.22K
-15V_MEASURE
D12 1N4005
R8 4.22K

+15 IN J1-1
+15 IN J1-2
NC J1-3
RTN IN J1-4
RTN IN J1-5

+5 IN J2-1
+5 IN J2-2
RTN IN J2-3
NC J2-4
RTN IN J2-5
R10 1K
+5V_MEASURE
R12 10K

+15 AUX IN J3-1
+15 AUX IN J3-2
NC J3-3
RTN IN J3-4
RTN IN J3-5
R13 2.32K
+15V_AUX_MEASURE
R14 1K

D21 +15 V
R24 1K
D24 -15 V
R21 1K
D23 +5 V
R22 220
D22 +15 V AUX
R23 1K

K3-A
K4-B
K3-B
K4-A

D14 1N4005
U3 LM317T IN OUT ADJ
D16 1N4005
R17 174
VR2 1K
+7.5 V CAL
-7.5 V CAL
VR1 1K
R16 174
D15 1N4005
U2 LM337T IN OUT ADJ
D13 1N4005
C7 15UF
C4 15UF
C6 100UF
C5 .1UF
C3 100UF
C2 .1UF

D3 STPS2030
D11 STPS2030
D2 STPS2030
D1 STPS2030
D10 95SQ015
D25 +7.5 V
R34 390
R33 390
D26 -7.5 V
D9 95SQ015
D7 STPS2030
D6 STPS2030
D5 STPS2030
D8 95SQ015

J5-1 +15 VD
J5-2 +15 VA
J5-3 +15 VP
J5-4 +7.5 V
J5-5 GNDD
J5-6 GNDA
J5-7 GNDHP
J5-8 GNDP
J5-9 GND_MILL-D
J5-10 GND AXIA
J5-11 GND CHASSIS
J5-12 -7.5 V
J5-13 -15 VD
J5-14 -15 VA
J5-15 -15 VP
J5-16 +5 V AXIA

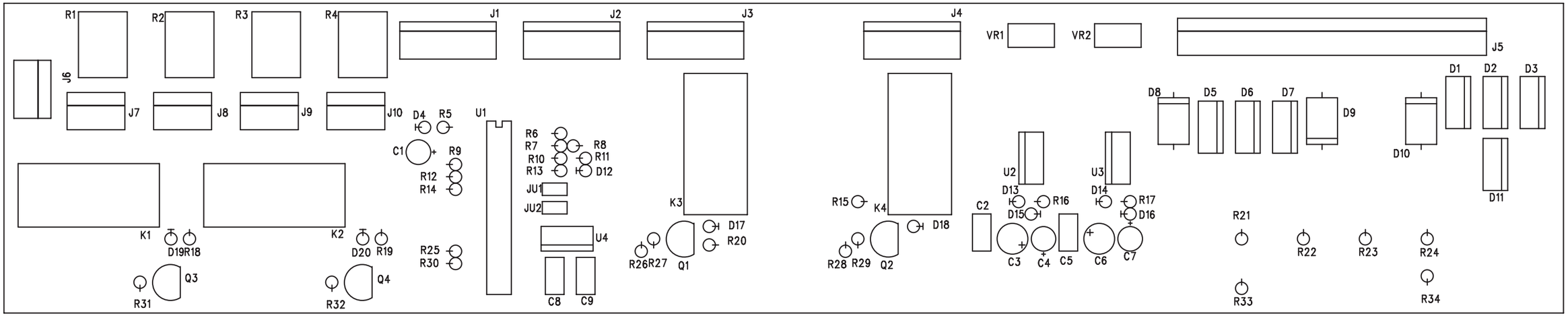
+15V
R19 100
D20 1N4005
K2-C
Q4 2N4401
R25 2.21K
R32 10K
R18 100
D19 1N4005
K1-C
Q3 2N4401
R30 2.21K
R31 10K
R15 100
D18 1N4005
K4-C
Q2 2N4401
R28 2.21K
R29 10K
R20 100
D17 1N4005
K3-C
Q1 2N4401
R26 2.21K
R27 10K

U1 PIC16F913-I/SP
MCLR
OSC1
OSC2
RC0
RC1
RC2
RC3
RC4
RC5
RC6
RC7
RB0
RB1
RB2
RB3
RB4
RB5
RB6
RB7
RA0
RA1
RA2
RA3
RA4
RA5
+5V
R5 10K
D4 1N4148
C1 10UF
INSTALL IF:
JU2 +5 V SUPPLY IS PRESENT
JU1 AUX +15 V SUPPLY IS PRESENT
+15V_MEASURE
-15V_MEASURE
+5V_MEASURE
+15V_AUX_MEASURE

D-25

DRAWN: SIRKIS	DATED: 4-13-2007	COMPANY: RADIO SYSTEMS LOGAN TOWNSHIP, NJ	
CHECKED:	DATED:	TITLE: MILLENIUM CONSOLE SWITCHING SUPPLY INTERFACE	
QUALITY CONTROL:	DATED:	CODE:	SIZE: D
RELEASED:	DATED:	DRAWING NO: BLANK BOARD 16222 ASSEMBLY +/-15 16223 ASSEMBLY +/-15 & +5 16224 ASSEMBLY +/-15 & +15 AUX 16225 ASSEMBLY +/-15 & +5 & +15 AUX 16226	REV:
		SCALE: NONE	SHEET: 1 OF 1

RADIO SYSTEMS
LOGAN TWP, NJ
MILLENIUM CONSOLE SWITCHING POWER SUPPLY CONTROLLER
BLANK BOARD 16222A
ASSEMBLY +15/−15 16223A
ASSEMBLY +15/−15 & +5 16224A
ASSEMBLY +/−15 & +15 AUX 16225A
ASSEMBLY +/−15 & +5 & +15 AUX 16225A
ASSEMBLY TOP



RADIO SYSTEMS
LOGAN TWP, NJ
MILLENIUM CONSOLE SWITCHING POWER SUPPLY CONTROLLER
BLANK BOARD 16222A
ASSEMBLY +15/−15 16223A
ASSEMBLY +15/−15 & +5 16224A
ASSEMBLY +/−15 & +15 AUX 16225A
ASSEMBLY +/−15 & +5 & +15 AUX 16225A
ASSEMBLY BOTTOM

POWER SUPPLY INTERFACE PARTS LIST

LINE	PART #	DESCRIPTION REFERENCE DESIGNATION	QTY.
10	16219	MILLENUIM D SWITCH PS CHASSIS	1
20	16220	MILLENUIM D SWITCH PS FRT PNL	1
21	8551	SCREW 10-32 X 1/2" BLACK OXIDE	4
22	9291	NUT KEP 10 10-32	4
30	16221	MILLENUIM D SWITCH PS COVER	1
35	16182	SCREW 4-40 X 1/4 TAPTITE	8
40	16209	POWER SUPPLY 15V 6.6A SWITCHER	2
45	8047	SCREW 6-32 X 5/8 PH PHIL	8
46	1093	WASHER LOCK #6	8
50	16451	CORCOM EMI FILTER	1
51	1091	SCREW 6-32 3/8 PANHEAD	2
60	16223	MILLENUIM D SWITCH BD #1	1
65	11315	SCREW 6-32 X 1/4 PH PHIL ITLW	6
70	9937	HOUSING 3 PIN .156	5
80	16453	HOUSING 12 PIN .156	2
90	11485	HOUSING 5 PIN MTA .156	2
100	11486	KEYING PLUG MTA .156	2
140	1154	NUT KNURL 6-32	2
150	2919	SCREW 6-32 X 1/2 PH PHIL	2
160	7646	KEP NUT #6	2
180	9155	POWER CABLE 3-COND TO IEC	1
190	16470	POWER SUPPLY CABLE PS-DIGITAL	1
210	1155	LUG #6 SOLDER	2
220	15156	RICHCO SNAP RIVET BLACK	2
230	16566	CONSOLE POWER SUPPLY BOX	1
240	16567	CONSOLE P/S FOAM END CAPS	2
250	16536	CABLE PS-DIGITAL POWER	1

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:
B	ADD W1		1-9-05

L. PGM MIX BUS J38-1
L. PGM MIX BUS J38-2
L_PGM_MONITOR_INPUT (3)
L. PGM OUTPUT LEVEL ADJ
J30-2 L. PGM OUTPUT –
J32-2 L. PGM OUTPUT –
J32-3 GND
J32-1 L. PGM OUTPUT +
J30-1 L. PGM OUTPUT +
L. PGM METER CAL
L. PGM MTR +
L. PGM MTR –
L. PGM PEAK LED CAL
+15VD
PEAK LED +15V
L. PGM PEAK LED

R. PGM MIX BUS J38-5
R. PGM MIX BUS J38-6
R_PGM_MONITOR_INPUT (3)
R. PGM OUTPUT LEVEL ADJ
J30-6 R. PGM OUTPUT –
J32-4 R. PGM OUTPUT –
J30-9 GND
J32-5 R. PGM OUTPUT +
J30-3 R. PGM OUTPUT +
R. PGM METER CAL
R. PGM MTR +
R. PGM MTR –
R. PGM PEAK LED CAL
R. PGM PEAK LED

L. AUD MIX BUS J38-9
L. AUD MIX BUS J38-10
L_AUD_MONITOR_INPUT (3)
L. AUD OUTPUT LEVEL ADJ
J29-2 L. AUD OUTPUT –
J31-2 L. AUD OUTPUT –
J31-3 GND
J31-1 L. AUD OUTPUT +
J29-1 L. AUD OUTPUT +
L. AUD METER CAL
L. AUD MTR +
L. AUD MTR –
L. AUD PEAK LED CAL
L. AUD PEAK LED

R. AUD MIX BUS J38-13
R. AUD MIX BUS J38-14
R_AUD_MONITOR_INPUT (3)
R. AUD OUTPUT LEVEL ADJ
J29-6 R. AUD OUTPUT –
J31-4 R. AUD OUTPUT –
J29-9 GND
J31-5 R. AUD OUTPUT +
J29-3 R. AUD OUTPUT +
R. AUD METER CAL
R. AUD MTR +
R. AUD MTR –
R. AUD PEAK LED CAL
R. AUD PEAK LED

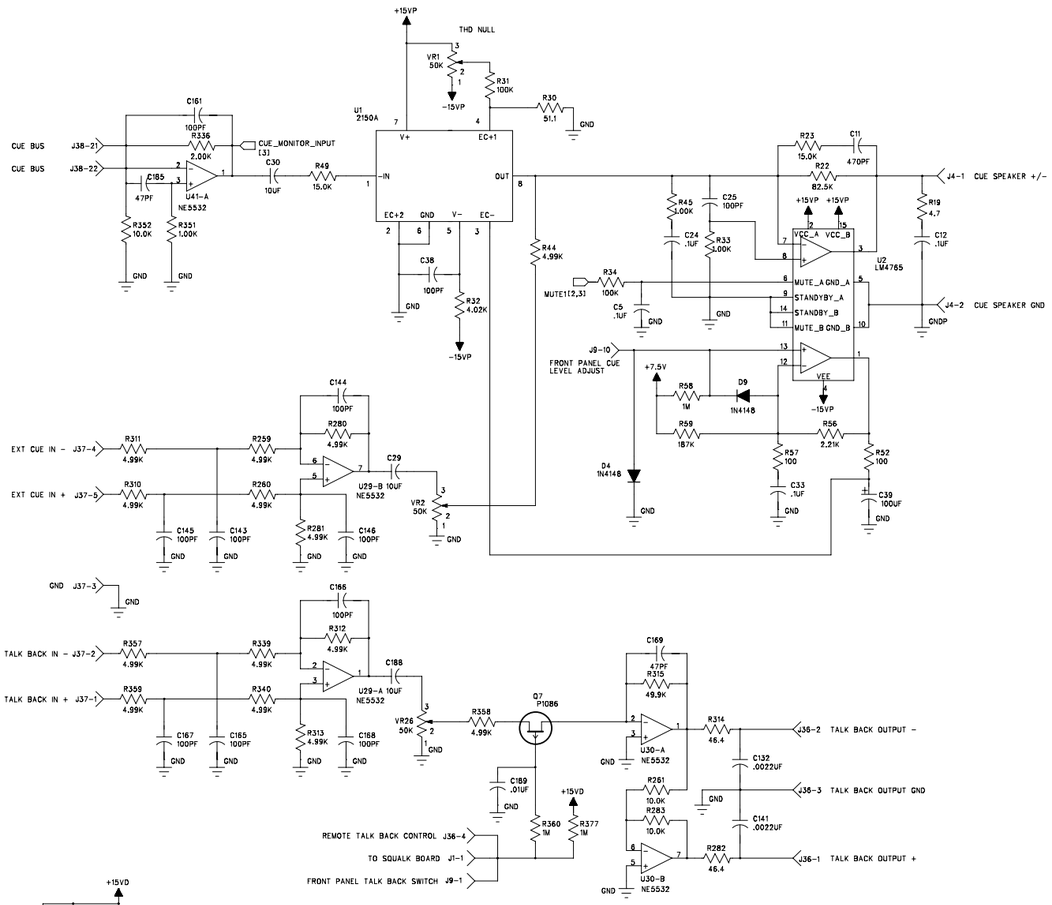
TEL MIX BUS J38-17
TEL MIX BUS J38-18
TEL_MONITOR_INPUT (3)
TEL OUTPUT LEVEL ADJ
J33-6 TEL OUTPUT –
J33-2 TEL OUTPUT –
J35-2 TEL OUTPUT –
J35-4 TEL OUTPUT –
J35-3 GND
J35-1 TEL OUTPUT +
J35-5 TEL OUTPUT +
J33-1 TEL OUTPUT +
J33-3 TEL OUTPUT +
J33-9 GND
TEL METER CAL
TEL MTR +
TEL MTR –
TEL PEAK LED CAL
TEL PEAK LED

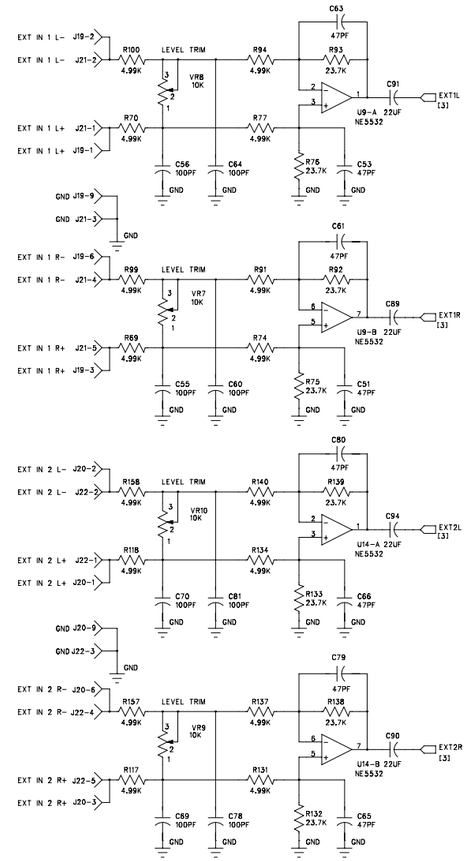
+7.5V
-7.5V
+15V
-15V
GND
GNDD

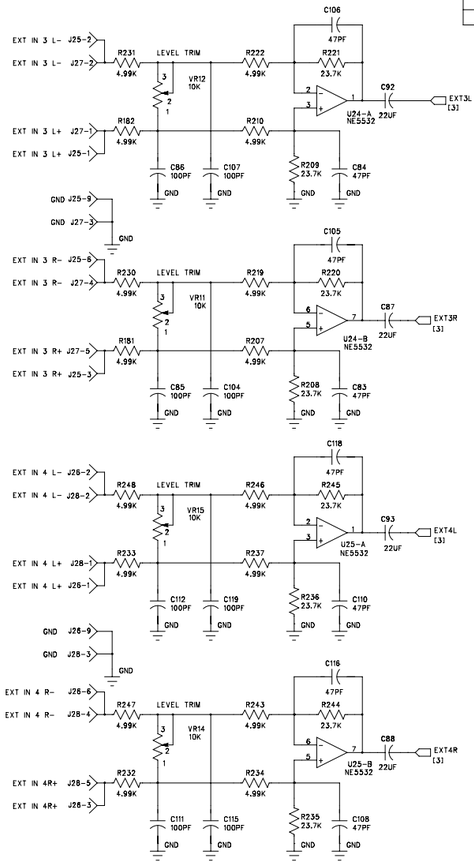
D-29

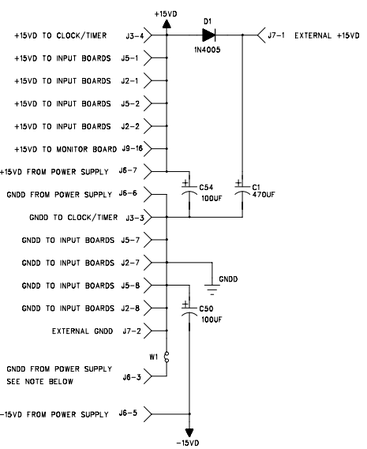
DRAWN: SIRKIS	DATED: 3-19-2003	COMPANY: RADIO SYSTEMS LOGAN TOWNSHIP, NJ	
CHECKED:	DATED:	TITLE: MILLENIUM OUTPUT BOARD	
QUALITY CONTROL:	DATED:	CODE:	SIZE: D
RELEASED:	DATED:	DRAWING NO: BLANK BOARD 147988 ASSEMBLY MILLENIUM-A 5 PIN 153718 ASSEMBLY MILLENIUM-A RJ45 153728 ASSEMBLY MILLENIUM-D 9 PIN 153738 ASSEMBLY MILLENIUM-D RJ45 153748	REV:
		SCALE: FULL	SHEET: 1 OF 3

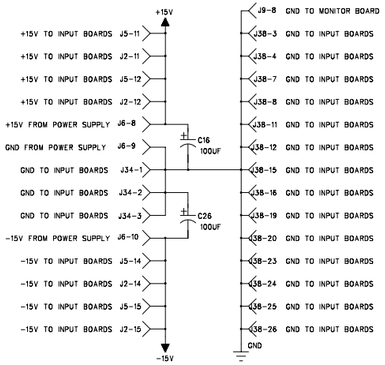
REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:
B	ADD W1		1-9-06

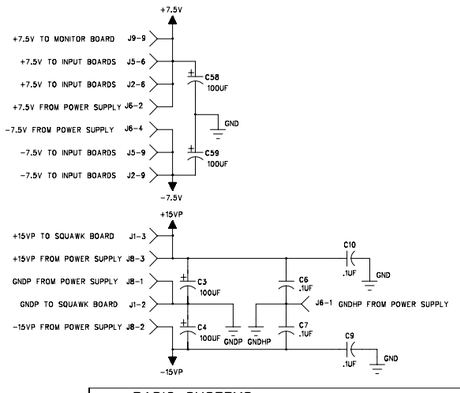









+15V
+15V TO INPUT BOARDS J5-11
+15V TO INPUT BOARDS J2-11
+15V TO INPUT BOARDS J5-12
+15V TO INPUT BOARDS J2-12
+15V FROM POWER SUPPLY J6-8
GND FROM POWER SUPPLY J6-9
GND TO INPUT BOARDS J34-1
GND TO INPUT BOARDS J34-2
GND TO INPUT BOARDS J34-3
-15V FROM POWER SUPPLY J6-10
-15V TO INPUT BOARDS J5-14
-15V TO INPUT BOARDS J2-14
-15V TO INPUT BOARDS J5-15
-15V TO INPUT BOARDS J2-15
C16 100UF
C26 100UF
-15V
J9-8 GND TO MONITOR BOARD
J38-3 GND TO INPUT BOARDS
J38-4 GND TO INPUT BOARDS
J38-7 GND TO INPUT BOARDS
J38-8 GND TO INPUT BOARDS
J38-11 GND TO INPUT BOARDS
J38-12 GND TO INPUT BOARDS
J38-15 GND TO INPUT BOARDS
J38-16 GND TO INPUT BOARDS
J38-19 GND TO INPUT BOARDS
J38-20 GND TO INPUT BOARDS
J38-23 GND TO INPUT BOARDS
J38-24 GND TO INPUT BOARDS
J38-25 GND TO INPUT BOARDS
J38-26 GND TO INPUT BOARDS
GND



D-30

COMPANY: RADIO SYSTEMS LOGAN TOWNSHIP, NJ			
TITLE: MILLENIUM OUTPUT BOARD			
DRAWN: SIRKIS	DATED: 3-19-2003	CODE:	SIZE: D
CHECKED:	DATED:	DRAWING NO: BLANK BOARD 147999 ASSEMBLY MILLENUM-A 5 PIN 153718 ASSEMBLY MILLENUM-A RJ45 153728 ASSEMBLY MILLENUM-D 5 PIN 153738 ASSEMBLY MILLENUM-D RJ45 153748	REV:
QUALITY CONTROL:	DATED:		
RELEASED:	DATED:	SCALE: FULL	SHEET: 2 OF 3

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:
B	ADD W1		1-9-06

L-_PGM_MONITOR_INPUT [1,3]
L-_AUD_MONITOR_INPUT [1,3]
TEL_MONITOR_INPUT [1,3]
CUE_MONITOR_INPUT [2,3]
EXT1L [2,3]
EXT2L [2,3]
EXT3L [2,3]
EXT4L [2,3]
R115 R114 R113 R116 R153 R156 R154 R155 4.99K
R89 R88 R87 R90 R198 R201 R199 R200 4.99K
U13-A 4051
COMMON
C100 22UF
R205 4.99K
R202 100K
U17-A NE5532
C99 47PF
R178 23.7K
R177 46.4
R121 10.0K
R128 10.0K
U17-B NE5532
R127 46.4
C35 10UF
R50 20.0K
J11-2 HEADPHONE OUT PREFADER L-
J13-2 HEADPHONE OUT PREFADER L-
C18 .0022UF
J13-3 GND
C15 .0022UF
J13-1 HEADPHONE OUT PREFADER L+
J11-1 HEADPHONE OUT PREFADER L+
HEADPHONE_A [2]
HEADPHONE_B [2]
HEADPHONE_C [2]
GND

R_-PGM_MONITOR_INPUT [1,3]
R_-AUD_MONITOR_INPUT [1,3]
TEL_MONITOR_INPUT [1,3]
CUE_MONITOR_INPUT [2,3]
EXT1R [2,3]
EXT2R [2,3]
EXT3R [2,3]
EXT4R [2,3]
R107 R106 R105 R108 R145 R148 R146 R147 4.99K
R81 R80 R79 R82 R188 R191 R189 R190 4.99K
U11-A 4051
COMMON
C102 22UF
R206 4.99K
R192 100K
U18-A NE5532
C101 47PF
R180 23.7K
R179 46.4
R122 10.0K
R130 10.0K
U18-B NE5532
R129 46.4
C23 10UF
R42 20.0K
J11-8 HEADPHONE OUT PREFADER R-
J13-4 HEADPHONE OUT PREFADER R-
C14 .0022UF
J11-9 GND
C17 .0022UF
J13-5 HEADPHONE OUT PREFADER R+
J11-3 HEADPHONE OUT PREFADER R+
GND

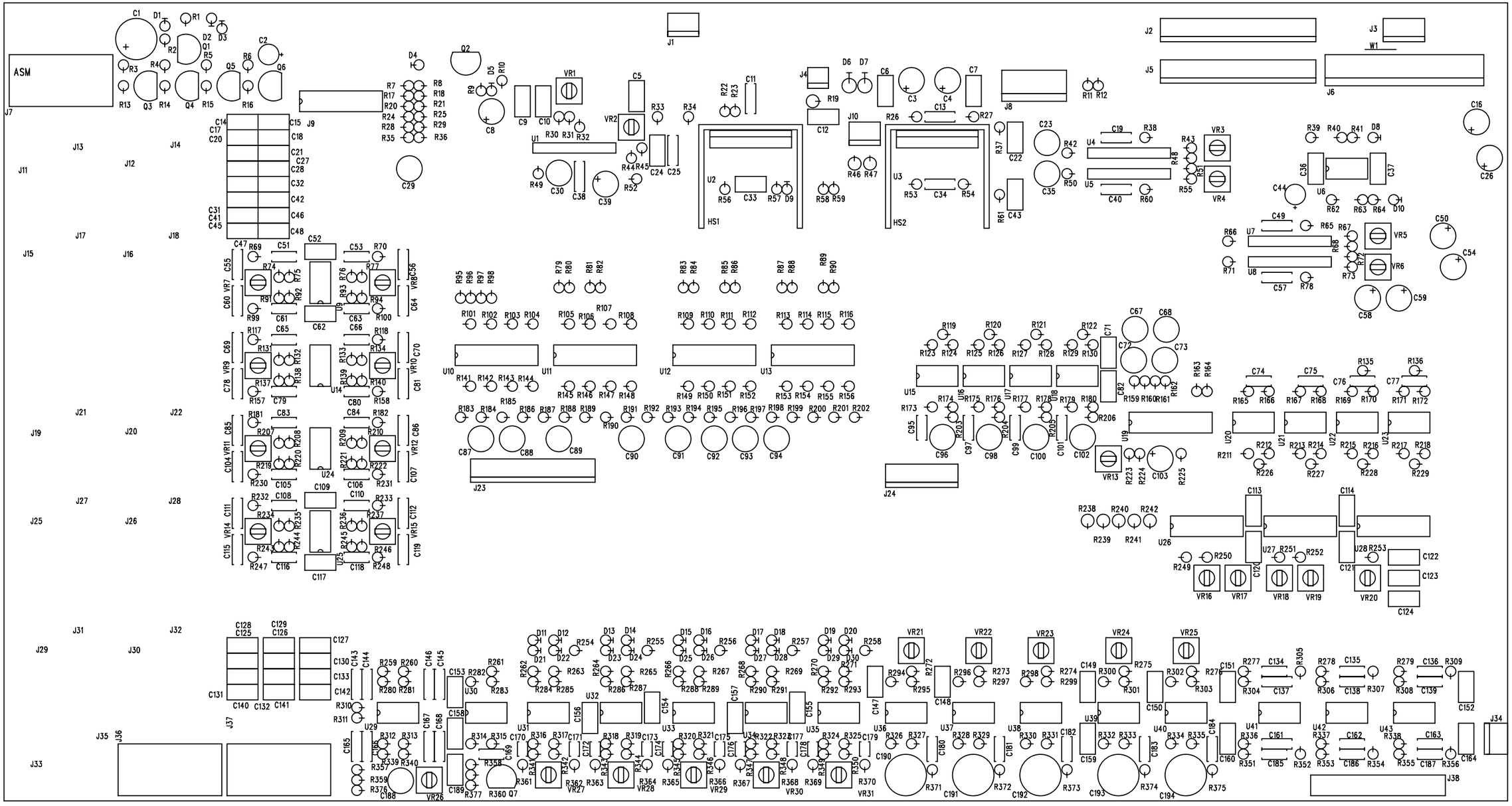
L-_PGM_MONITOR_INPUT [1,3]
L-_AUD_MONITOR_INPUT [1,3]
TEL_MONITOR_INPUT [1,3]
CUE_MONITOR_INPUT [2,3]
EXT1L [2,3]
EXT2L [2,3]
EXT3L [2,3]
EXT4L [2,3]
R111 R110 R109 R112 R149 R152 R150 R151 4.99K
R85 R84 R83 R86 R193 R196 R194 R195 4.99K
U12-A 4051
COMMON
C96 22UF
R203 4.99K
R197 100K
U15-A NE5532
C95 47PF
R174 23.7K
R173 46.4
R119 10.0K
R124 10.0K
U15-B NE5532
R123 46.4
C68 10UF
C73 22UF
R71 20.0K
R162 100K
J16-2 UNMUTED MONITOR OUT L-
J18-2 UNMUTED MONITOR OUT L-
C48 .0022UF
J18-3 GND
C46 .0022UF
J18-1 UNMUTED MONITOR OUT L+
J16-1 UNMUTED MONITOR OUT L+
MONITOR_A [2]
MONITOR_B [2]
MONITOR_C [2]
GND

R_-PGM_MONITOR_INPUT [1,3]
R_-AUD_MONITOR_INPUT [1,3]
TEL_MONITOR_INPUT [1,3]
CUE_MONITOR_INPUT [2,3]
EXT1R [2,3]
EXT2R [2,3]
EXT3R [2,3]
EXT4R [2,3]
R103 R102 R101 R104 R141 R144 R142 R143 4.99K
R97 R96 R95 R98 R183 R186 R184 R185 4.99K
U10-A 4051
COMMON
C98 22UF
R204 4.99K
R187 100K
U16-A NE5532
C97 47PF
R176 23.7K
R175 46.4
R120 10.0K
R126 10.0K
U16-B NE5532
R125 46.4
C72 22UF
C67 10UF
R66 20.0K
J16-8 UNMUTED MONITOR OUT R-
J18-4 UNMUTED MONITOR OUT R-
C45 .0022UF
J16-9 GND
C47 .0022UF
J18-5 UNMUTED MONITOR OUT R+
J18-3 UNMUTED MONITOR OUT R+
GND

U5 2150A
THD NULL
VR4 50K
R55 100K
R51 51.1
C40 100PF
R60 4.02K
R39 2.21K
U6-B MC4558
R40 187K
R41 1M
J9-12 FRONT PANEL HEADPHONE LEVEL ADJUST
1N4148 D8
U4 2150A
C19 100PF
R38 4.02K
R43 100K
VR3 50K
R48 51.1
U8 2150A
THD NULL
VR6 50K
R73 100K
R72 51.1
C57 100PF
R78 4.02K
R64 1M
R63 187K
R62 2.21K
U6-A MC4558
C44 1UF
D10 1N4148
U7 2150A
C49 100PF
R65 4.02K
R67 100K
R68 51.1
VR5 50K
THD NULL
U19-A 4053
A/DI
B/DI
CX
CY
AX
AY
BX
BY
CX_OR_CY
INH
R161 4.99K
R160 4.99K
R159 100K
R225 4.99K
J9-11 FRONT PANEL MONITOR LEVEL ADJUST
VR13 10K
R223 1.00K
R224 100
C103 100UF
R12 1M MUTE2 [2]
R11 1M MUTE1 [2]
R164 1M
R163 1M
GNDD
R61 1.00K
C43 .1UF
R54 1.00K
C22 .1UF
R27 1.00K
R37 1.00K
C34 100PF
C13 100PF
R53 33.2K
U3 LM4765
VCC_A VCC_B
MUTE_A GND_A
STANDBY_A
STANDBY_B
MUTE_B GND_B
VEE
R47 47
R46 47
R26 33.2K
D7 P6KE18CA
D6 P6KE18CA
J10-3 HEADPHONE JACK LEFT
J10-2 HEADPHONE GND
J10-1 HEADPHONE JACK RIGHT
GNDHP
R135 4.99K
R136 4.99K
U22-B NE5532
U22-A NE5532
U23-B NE5532
U23-A NE5532
C76 47PF
R170 10.0K
R169 46.4
C42 .0022UF
R228 10.0K
R216 10.0K
C32 .0022UF
R215 46.4
C77 47PF
R172 10.0K
R171 46.4
C31 .0022UF
R229 10.0K
R218 10.0K
C41 .0022UF
R217 46.4
J15-2 STUDIO MONITOR L-
J17-2 STUDIO MONITOR L-
J17-3 GND
J17-1 STUDIO MONITOR L+
J15-1 STUDIO MONITOR L+
J15-6 STUDIO MONITOR R-
J17-4 STUDIO MONITOR R-
J15-9 GND
J17-5 STUDIO MONITOR R+
J15-3 STUDIO MONITOR R+
C74 47PF
R166 39.2K
R165 46.4
U20-B NE5532
R226 10.0K
R212 10.0K
R211 46.4
U20-A NE5532
C75 47PF
R168 39.2K
R167 46.4
C21 .0022UF
C28 .0022UF
J12-1 CONTROL ROOM MONITOR L+
J14-1 CONTROL ROOM MONITOR L+
J14-3 GND
J14-2 CONTROL ROOM MONITOR L-
J12-2 CONTROL ROOM MONITOR L-
U21-B NE5532
R227 10.0K
R214 10.0K
R213 46.4
U21-A NE5532
C20 .0022UF
C27 .0022UF
J12-3 CONTROL ROOM MONITOR R+
J14-5 CONTROL ROOM MONITOR R+
J12-9 GND
J14-4 CONTROL ROOM MONITOR R-
J12-6 CONTROL ROOM MONITOR R-

D-31

DRAWN: SIRKIS	DATED: 3-19-2003	COMPANY: RADIO SYSTEMS LOGAN TOWNSHIP, NJ	
CHECKED:	DATED:	TITLE: MILLENIUM OUTPUT BOARD	
QUALITY CONTROL:	DATED:	CODE:	SIZE: D
RELEASED:	DATED:	DRAWING NO: BLANK BOARD 147998 ASSEMBLY MILLENIUM-A 5 PIN 153718 ASSEMBLY MILLENIUM-A RJ45 153728 ASSEMBLY MILLENIUM-D 5 PIN 153738 ASSEMBLY MILLENIUM-D RJ45 153748	REV:
		SCALE: FULL	SHEET: 3 OF 3



MILLENIUM OUTPUT BOARD
BLANK BOARD 14799B
ASSEMBLY MILLENIUM-A 5 PIN 15371B
ASSEMBLY MILLENIUM-A RJ45 15372B
ASSEMBLY MILLENIUM-D 5 PIN 15373B
ASSEMBLY MILLENIUM-D RJ45 15374B

Analog Output Board Parts List

LINE	PART #	DESCRIPTION REFERENCE DESIGNATION	QTY.
10	14799	MILLENIUM OUTPUT BOARD DETAIL	1
20	2828	RES 4.7 OHM 1/2W 5% Ref: R19	1
30	1009	RES 47 OHM 1/2W 5% Ref: R46;R47	2
40	8883	RES 1.8K 1/2W 5% Ref: R242;R241;R240;R238;R239	5
50	5876	RES 100K 1/4W 1% Ref: R34;159;162;187;192;197;202;1;10	9
60	10813	RES 4.99K 1/4W 1% Ref: R15;R16;R44;69;70;74;77;79-91;94-118;131;134-137;140-158	66
70	10813	RES 4.99K 1/4W 1% Ref: R160;161;181-186;188-191;193-196;13;198-201;14;203-207;210 219;222;225;230-234;237;243;246-248;259;260;280;281;310-313 339;340;357-359	57
80	5716	RES 1.0 MEG 1/4W 1% Ref: R8;21;24;25;28;29;163;164;35;36;11;12;41;17;58;64;7;360;377 R18;R20	21
90	5723	RES 4.02K 1/4W 1% Ref: R78;38;60;306;308;65;337;338;32	9
100	5873	RES 46.4 OHM 1/4W 1% Ref: R173;175;177;179;165;211;213;215;217;123;125;127;129;282;294 296;298;300;302;167;169;314;326;328;330;332;334;171	28
110	5726	RES 20.0K 1/4W 1% Ref: R50;R42;R66;R71	4
120	8794	RES 221 OHM 1/4 W 1% Ref: R31;R55;R43;R73;R67	5
130	2816	RES 10.0K 1/4W 1% Ref: R229;119-122;216;4;124;218;126;214;128;212;261-276;130; 283-293	50
140	2816	RES 10.0K 1/4W 1% Ref: R295;297;299;301;303;305;307;309;5;327;226;329;331;333;335; 170;341-350;352;354;356;227;228;6;3;361-370;172	35
150	5872	RES 1.0K 1/4W 1% Ref: R33;37;277;223;351;9;45;61;27;54;371-376	16
160	8813	RES 226K 1/4W 1% Ref: R319-325;316-318	10
170	1143	RES 100 OHM 1/4W 1% Ref: R224;57;52	3
180	9299	RES 2.0K 1/4W 1% Ref: R336;278;353;355;279;304	6
190	5882	RES 4.7M 1/4W 5% Ref: R253;249-252	5
200	5729	RES 2.21K 1/4W 1% Ref: R56;62;39	3
210	14810	RES 23.7K 1/4W 1% Ref: R209;76;178;176;180;220;221;235;236;244;245;92;93;174;208; 132;133;75;138;139	20
220	5727	RES 15.0K 1/4W 1% Ref: R49;23	2
230	5734	RES 187K 1/4W 1%	3
240	5725	RES 392 OHM 1/4W 1% Ref: R256;254;257;258;255	5
250	7512	RES 82.5K 1/4W 1% Ref: R22	1

LINE	PART #	DESCRIPTION REFERENCE DESIGNATION	QTY.
260	7513	RES 49.9K 1/4W 1% Ref: R315;R2	2
270	10383	CAP 5PF DISC 500V 5% NPO Ref: C170-C179	10
280	7482	CAP 470PF 50V DISK Ref: C11	1
290	5739	CAP 100PF DISC 5% 100V Ref: C13;19;25;34;38;40;49;55-57;60;64;69;70;78;81;85;86;104;107 111;112;115;119;137;143-146;161;165-168	34
300	5743	CAP .1UF FILM Ref: C5-7;9;10;12;22;24;33;36;37;43;52;62;71;82;109;113;114;117; 120-124;147-160;164	40
310	5863	CAP .0022UF 50V FILM Ref: C45;125-133;140-142;46-48;14;15;27;28;31;32;17;18;20;41;42;	28
320	5860	CAP .01UF 5% 50V FILM Ref: C189	1
330	5744	CAP 100UF 25V RAD 20% Ref: C2;C3;4;8;16;26;39;50;54;58;59;103	12
340	7012	DIODE 1N4005 Ref: D1;D5	2
350	1012	DIODE 1N4148 Ref: D2;D3;D4;D8;D9;D10	6
360	7535	CAP 470 UF 25V ELEC Ref: C1	1
370	15339	DIODE 1N270 Ref: D11-D30	20
380	5865	CAP 1UF 20% 50V ELECT Ref: C44	1
390	14824	TRANSIENT VOLTAGE SUPPRESSOR Ref: D6;D7	2
400	5751	TRANSISTOR P1086 Ref: Q7	1
410	6118	TRANSISTOR 2N4401 Ref: Q3;Q4;Q5;Q6	4
420	14850	POT 50K TOP ADJ Ref: VR1;VR2;VR3;VR4;VR5;VR6;VR26	7
430	6119	TRANSISTOR 2N4403 Ref: Q1;Q2	2
440	7995	POT 10K TOP ADJUST Ref: VR8-VR25;VR7;VR27-VR31	24
450	1014	CAP 10UF 25V NP Ref: C23;29;30;35;67;68;188	7
460	15340	IC VCA 2181LB Ref: U1;U4;U5;U7;U8	5
470	1049	CAP 100UF 25V NP Ref: C190-194	5
480	1011	SOCKET 8 PIN DIP Ref: REF; U6;U9;U14;U15;U16;U17;U18;U20;U21;U22;U23;U24;U25;U29	14
490	1011	SOCKET 8 PIN DIP Ref: REF;U30;U31;U32;U33;U34;U35;U36;U37;U38;U39;U40;U41;U42;U43	14
500	1039	SOCKET 16 PIN DIP Ref: U10;U11;U12;U13;U19;J9	6
510	13049	IC LM4765T Ref: U2;U3	2
520	1027	SOCKET 14 PIN DIP Ref: REF;U26;U27;U28	3

LINE	PART #	DESCRIPTION REFERENCE DESIGNATION	QTY.
530	1010	IC 5532 Ref: U9;U14-U18;U20-U25;U29-U43	27
540	3675	IC 4558 Ref: U6	1
550	1042	IC LM339N Ref: U26;U27;U28	3
560	6120	IC 4051 Ref: U10;U11;U12;U13	4
570	5752	IC 4053 Ref: U19	1
580	5756	HEADER 26 PIN DUAL ROW .1 Ref: J38	1
590	5753	HEADER 5 PIN Ref: J7;36;37	3
600	11338	RJ45 VERTICAL SHIELDED Ref: J11;J12;J15;J16;J19;J20;J25;J26;J29;J30;J33	11
610	7050	HEADER 2 PIN MTA .1 Ref: J4	1
620	5892	HEADER 3 PIN MTA .1 Ref: J1;J10;J34	3
630	7051	HEADER 4 PIN MTA .1 Ref: J3	1
640	5890	HEADER 7 PIN MTA .1 Ref: J24	1
650	5891	HEADER 12 PIN MTA .1 Ref: J23	1
660	5749	HEADER 15 PIN MTA .1 Ref: J2;J5	2
670	7502	HEADER 4 PIN MTA .156 Ref: J8	1
680	5893	HEADER 10 PIN MTA .156 Ref: J6	1
690	7872	HEAT SINK RS OUTPUT BOARD Ref: REF;U2;U3	2
700	13047	SIL-PAD LARGE TO-220 Ref: REF; U2;U3	2
710	7646	KEP NUT #6 Ref: REF; U2;U3	2
720	9142	SCREW PH PHIL 6-32 X 1/4 Ref: REF; U2;U3	2
730	14892	CAP 47PF 100V NP0 (.20 LEAD) Ref: C51;53;61;63;65;66;74-77;79;80;83;84;95;97;99;101;105;106; 108;110;116;118;134;135;136;138;139;162;163;169;180-187	40
740	7518	RES 39.2K 1/4W 1% Ref: R166;R168	2
750	9048	RES 33.2K 1/4W 1% Ref: R26;R53	2
760	9662	CAP 22UF 25V NP Ref: C73;87-94;96;98;100;102;72	14

Millenium Console Specifications

Models Available

RS-6A: 6 Channel RS-12A: 12 Channel RS-18A: 18 Channel RS-24A: 24 Channel

Audio Inputs

Type: Differentially balanced instrumentation amplifiers with gain set jumpers and selectable input attenuators

Level: Jumper selectable gain settings to accommodate nominal input levels from -60 dBm to +10 dBm. Maximum input level: +22 dBm

Impedance: 20K ohms or jumper selected

Headroom: 22 dBm at any level

Line Outputs

Type: Active Balanced

Level: Adjustable 0 dBm to +10 dBm, maximum output +22 dBm

Impedance: 100 ohms

Distortion: .008% at nominal operating level, 20 Hz to 20 kHz, PGM, AUD, and Mono outputs

Signal to Noise:

88dB (or better) below +4 dBm output with 0 dBv input level, 20 kHz bandwidth, 600 ohm source impedance (line to line)

74 dB (or better) below +4 dBm output with - 50 dBv input level, 20 kHz bandwidth, 150 ohm source impedance (mic to line)

Headphone Output

Level: 1 volt RMS nominal, 10 volts RMS maximum into 600 ohm headphone

Distortion: .05% typical, .1% maximum

Impedance: 50 ohms to front panel jack, 330 ohms to prefader (external amp) output

Monitor Sends

Level: 1 volt RMS nominal, 10 volts RMS maximum, 330 ohm unbalanced

Cue Output

2 watts RMS into 8 ohm speaker

Dimensions

6 Channel: 20 3/4" Long x 27" Deep x 9" High

12 Channel:32 3/4" Long x 27" Deep x 9" High

18 Channel:44 3/4" Long x 27" Deep x 9" High

24 Channel:56 3/4" Long x 27" Deep x 9" High

Power Consumption

240 Watts Maximum

Millenium Consoles - Warranty and Repair Policies

Warranty

Radio Systems, Inc., warrants this equipment to be free from defects in materials and workmanship for a period of two (2) years for all electronic parts and subassemblies and a period of one (1) year for all mechanical parts such as faders and meters..

This warranty extends to first users of the product and future owners who purchase the product within the warranty period.

The terms of this warranty are null and void if this product is stored or operated in an environment not conducive to electronic equipment, or shows signs of misuse or modifications which affect the proper functioning of the product. This warranty does not apply to damage caused by fire, smoke, flood, lightning, or acts of nature and physical abuse.

Radio Systems, Inc., and its associated companies, authorized distributors, and personnel are not liable for loss of revenues or other damages, or effects to the broadcast signal quality or coverage which may result from the from the improper functioning of this product.

Repair Policy

Technical assistance is available at any time, at no charge, by phone or correspondence.

During the warranty period, there will be no charge for parts or service made to units which show no sign of misuse by customer or lightning caused damage. The customer is responsible for the cost of shipping their unit back to Radio Systems for repair.

During the warranty period, shipment of small parts and assemblies will be made at no charge to the user. Emergency, next day shipments of replacement parts and circuits will also be made at no charge at the user's request . Chargeable services will be made COD or on Net-30 day terms to users with established accounts.

During the warranty period, users must return defective parts upon request to receive no-charge warranty services. Return shipping expenses are the responsibility of the user.

Return Instructions

Contact Radio Systems for a return authorization number.

Pack all items carefully and ship prepaid, via UPS insured, to:

Radio Systems, Inc.
Attn: R.A. # _____
601 Heron Drive
Logan Twp., NJ 08085